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MICROCOMPUTING



Gaining Ground.

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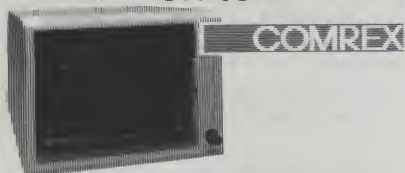
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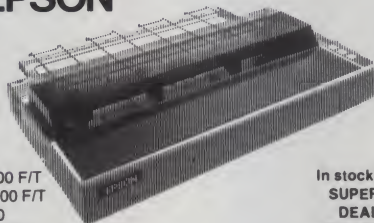
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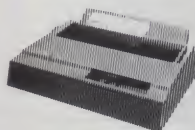
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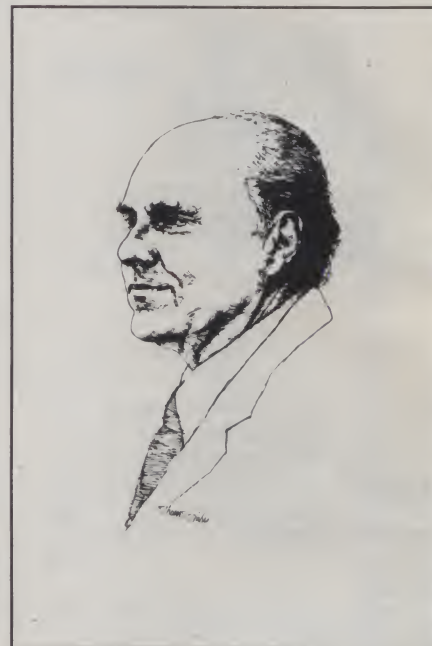


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PUBLISHER'S REMARKS

By
Wayne Green

Don't Fly Those Skies



Boycott Eastern!

When an airline gratuitously bans the use of the greatest executive travel aid yet invented it's time to fight back. I'm talking about the new kneetop computers that allow a businessman to sit on a plane and, without annoying the other passengers, do his work.

I was shocked and angered when I heard of Eastern Airlines' decision to prohibit the use of my workstation. I've used mine on dozens of flights since buying it last April.

It's worked for me on the Concorde to London and back, on a recent trip around the world and on innumerable flights within the United States, all with no problems to anyone.

My kneetop computer lets me write editorials for my six monthly computer magazines and for my magazine for electronics hobbyists, 73. I use it to answer my mail, write memos, keep notes, have addresses and phone numbers handy, and keep my appointment schedule. I'd be lost without it.

No Potential Danger

If there were any technical reasons for banning this type of portable computer, I wouldn't be so upset, but there have been no tests that show any potential interference with any of the plane's navigation or communications equipment.

Indeed, as an expert on both radio communications (an old pilot myself) and computers, I've carefully tested my own kneetop computer and found it free from generating interference.

The Federal Aviation Administration has also run careful tests—even to the

point of holding a computer right up against the plane's equipment. Nothing. The FAA says further that it has no reports of any interference from portable computers.

In the face of this evidence, there seems to be no good reason for the Eastern ban—so I'm banning Eastern from my travel plans and I'm taking airlines that let me do my work. Further, I'm asking every reader to pass the word and help me fight back against Eastern and its decision. Let's boycott Eastern until it makes its skies friendlier for businessmen.

You may not have discovered how much you can get done in between the snacks aloft when you answer mail instead of watching an old movie. Unless you join me in fighting back against this slap at business, you're going to have to continue to waste much of your flight time.

These kneetop computers beat the heck out of even the best of portable typewriters. The clicking from those can drive nearby passengers nuts.

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Let's not take this reclining; let Eastern know that it's really screwing up when it messes with businessmen. □

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During the past year, we've noticed a sharp increase in the number of what could be considered "single-product" microcomputer shows. Maybe it was the phenomenal success of Applefest that gave the sponsors of all these shows, Northeast Expositions, the encouragement to organize other single-product, end-users shows.

We recently visited two of these exhibitions: CP/M '83 East and PC '83.

CP/M '83 East

Gathered under one roof were thousands of products designed for the CP/M environment. The Hynes Auditorium in Boston was the site of the second international CP/M exposition (the first was in January in San Francisco).

Digital Research was prominent, with its exhibit demonstrating its DR Logo and DR Graph.

Across the way, Digital Equipment Corp. grabbed its share of the spotlight, showing off its new Rainbow 100+ machine.

DEC made its new marketing debut by offering demo Rainbows to many exhibitors in the hall. There were even Rainbows in the press room!

Other major exhibitors included MicroPro and Advanced Logic Systems (the folks who turn Apples into CP/M-compatible machines with a plug-in cord).

We're anxious to get our hands on a few of the innovative products we saw. Look for our review on the Dimension

Computer by MicroCraft. The company claims its machine can run Apple, IBM, TRS-80, UNIX and, of course, CP/M software. If it was nothing else, CP/M '83 East was a strong statement for the continued staying power of CP/M.

PC '83

The IBM show, also a first for the northeast, took place at Boston's new Bayside Exposition Center.

The mood of the IBM show was indicative of how the PC is perceived—with a sense of seriousness. The IBM booth was large and prominent (more than 2000 square feet!).

While the IBM staff was helpful, there were no startling unveilings (or any unveilings, for that matter).

Across the way was a large exhibit by DEC, who was once again showing off its Rainbow 100+—a machine positioned directly against IBM PC-XT. There wasn't much socializing across that aisle!

Hewlett-Packard had a modest booth to demonstrate its new touch-screen HP-150.

There were quite a few impressive hardware and software displays exploiting the PC's fine graphics capabilities. Other vendors had an opportunity to demonstrate their specialized software.

In future issues, we'll be reporting in detail on some of the interesting products introduced at CP/M '83 East and PC '83.

K.T.

Sneak Previews

In January, *Microcomputing* will be packed with interesting and useful articles on graphics.

We'll have a major system review of the graphics power of the Sony SMC-70 with the Genlocker peripheral, which interfaces the micro with video equipment.

The NCR Decision Mate V has entered the market with some impressive business graphics capabilities. We'll take a look at that, too.

If you don't know much about Telidon now, you will after reading Jerry Waese's informative article about the standard for encoding graphics images. The hows of computer-aided design, along with some consideration of CAD, will be discussed in the first of a two-part article computer-aided design for the Apple II.

Tax season is here—and your personal computer just might qualify as a tax deduction. Our article, "The Personal Computer As A Tax Deduction," was written by tax specialists. It will answer just about any question you may have on the subject.

For the thousands of IBM/WordStar users, we'll print a program listing enabling you to reassign or redefine the IBM function keys under WordStar.

Most of the micro industry is probably suffering from "Peanut envy." With the start of the new year, we'll look at the reason for it: IBM's follow-up to the PC. Will this hotly anticipated new micro be as highly regarded as its big brother? *Microcomputing* will separate rumor from fact on what has been called everything from "The Peanut" to "PCjr." □

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The STX-80 printer from Star. It's the perfect gift for every computer user in your life. Especially if one of them happens to be you!

Enjoy your presents and have a happy and healthy holiday.

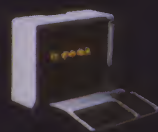
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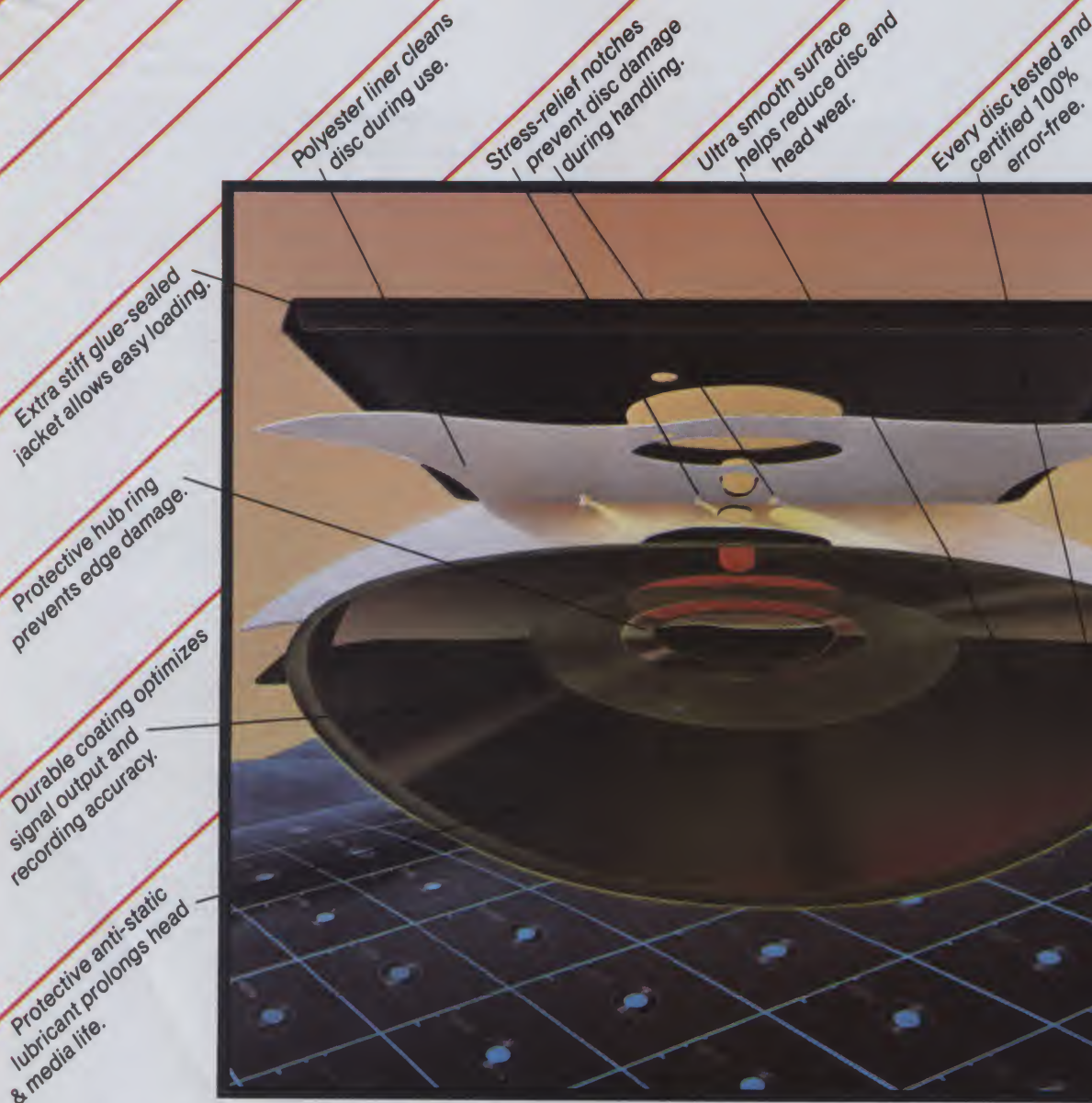
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Inimitable IBM: The Secret's Out

PCjr Unveiled On the Heels Of the XT/370

In this issue of "Overview," we'll examine the impact of the IBM PCjr and the IBM PC XT/370. These are systems positioned below and above the common PC in power and price.

IBM has clearly shown that the original PC is now a central product in its marketing strategy. It has placed products around the original PC in a profusion that could actually lead to confusion in the market.

On September 18, 1983, IBM announced the PC XT/370. On November 1, 1983, it raised the curtain on the long-awaited "Peanut," which it has chosen to call the "PCjr." Both of these releases expand the PC family and extend the ability of the company to market the PCs to both sophisticated business people and casual home users. Because it's more fun, let's look at the Junior first.

Peanut Grinder Makes Apple Sauce!

Once upon a time (all good stories start that way), the Xerox corporation thought it would develop a microcomputer to

challenge the lofty marketing position held by the Apple II. The code name for this product was reported to be "Worm." As the Worm (the Xerox 820) turned out,



Microcomputing Technical Editor Jim Heid gets the feel of the PCjr at its unveiling in the IBM building in New York, November 1.



it was a limp creature that wasn't even able to dent the peel on the Apple.

Now there is a new critter in the garden that has an eye set on the Apple crop, but instead of trying to worm his way into the apple, this beast is going to shake the whole tree!

Many people have depicted IBM as a slow, ponderous elephant. The joke about teaching the elephant to tap dance has become a common reference in the industry. But the recent actions of this company have made it clear that its mascot should instead be a grizzly bear!

The IBM bear has been prowling and sniffing the air, and it smelled some ripe sales in an area just below its PC offspring. The bear denned up for a few months, and then, on November 1, it brought out a new cub, the PCjr.

Junior seems to have been conceived with one idea in mind: to challenge Apple, Atari and Radio Shack on their home grounds. It is venturing into an area that has defeated Texas Instruments and

Contact the author at PO Box 691, Herndon, VA 22070.

Timex/Sinclair. Less directly, it will challenge the powerful marketing positions of the Commodore-64 and the Coleco Adam.

Junior Size

The Junior is nothing new. Its most innovative aspect is a cordless keyboard that communicates to the main unit through an infrared light link. Aside from that unique interface, Junior is simply a pint-sized repackaging of its older brother with a little better ability to play music (three voices) through its internal speaker.

A PCjr system consists of the system unit, a cordless keyboard and a separate power transformer. The system unit is about 14 inches long, 11 inches deep and four inches high. It weighs nine pounds.

Note that the basic PCjr system doesn't include a monitor. You can choose to use a standard television set (with some limitation in the presentation), a monochrome monitor (not the standard PC monochrome monitor) or an RGB color display. You have to add various optional interface cables to the system unit to connect to the video display you select.

The keyboard has 62 keys that are full travel, but they have squishy rubber domes on the top that could slow down a touch-typist. The keytops themselves do not have any numbers or letters on them, but are identified on a template that is overlaid on the keyboard.

Four AA batteries are placed in the keyboard unit to provide power to its internal logic and its light link. An optional cord is available to attach the keyboard to the main unit if two systems are being used in the same room or if the batteries go out. Normal range for the cordless keyboard is about 20 feet, but the system unit must be able to physically see the keyboard.

Junior uses the same 8088 processor used in the PC. It doesn't, however, have the PC's expansion bus structure used to add additional memory and input/output devices. There are places to add ports and expansion memory, but they aren't part of the same bus architecture used on the PC. IBM has announced an internal modem and parallel and serial ports for the Junior.

IBM has taken a clue from Atari and Texas Instruments computers and included in the Junior the ability to accept two program cartridges. IBM has published the specifications for these cartridges, and it's safe to bet that program houses are rushing to provide software in this format.

The marketing target of the PCjr was clearly demonstrated by the inclusion of joysticks and games in the product line. The IBM joysticks have two control buttons and either free-floating or spring-loaded operation. The joysticks sell for \$40 each, and most games marketed by IBM will have a price tag of about \$35.

Two Juniors

IBM has initially released the Junior in two versions: an entry model and a full-power model.

The entry model (dubbed "Pee-Wee" by some observers) is simply a stripped-down version of the Junior that can be upgraded. This version comes with 64K of RAM and 64K of ROM. It is intended for use with ROM cartridges or a cassette tape recorder and does not contain a disk drive. The entry version displays less than 40 characters and graphics in color on the screen of a television set or monitor. Its price is \$669.

In this entry-level configuration, the PCjr is a head-to-head-competitor with the Atari line.

The Atari 800 is nearly four years old,

but it has some advantages over the Junior. The Atari has an established base of software and users, it has an excellent keyboard, it still has perhaps the best graphics display in the low-price industry and it's being deeply discounted. If you shop carefully, you can add a disk drive to an Atari 800XL and equal the price of the PCjr without a disk drive.

The entry model of the PCjr has few real advantages over Atari systems. Certainly Junior can call on the huge existing base of 8088 software and programming experience that exists in the industry, but there are problems to be faced in moving the existing software into the entry-level Junior.

The low-level Junior doesn't have a disk drive to take advantage of its bigger brother's programs. Most of those programs require more than 64K of RAM to be effective. Others that can work in 64K of RAM, such as WordStar, function much better with displays providing at least 64 characters on a line.

IBM has announced some general-purpose software, such as word processing and home finance, for the PCjr, but the proven software from the mainstream PC line will not help the entry-level system survive in the face of strong competition.

The entry-level IBM PCjr suffers even more when it is compared with the Commodore-64. Disk drives for the C-64 may be scarce and rumors of quality control problems abound, but there are many happy C-64 owners who know they got a lot of computing power at a bargain price. A C-64 with a disk drive and an 80-column display can be purchased for less than the price of the entry-level PCjr.

The power of the IBM name may have Atari and Commodore up on their toes, but point-by-point comparison to the PCjr should show them that they have nothing to dread.

Junior Eats Apples

The standard PCjr, however, is quite another matter. The boys at Apple had better be ready to either pull a rabbit out of the hat or take the Apple IIe into a power dive on the price curve. The IBM bear cub is shaking their tree!

The standard PCjr comes with 64K of ROM, 128K of RAM and a 360K half-high disk drive that uses the same format and operating system (DOS 2.1) as the standard IBM PC. It has an 80-column display screen capability that requires the use of a monochrome video monitor or RGB color monitor. The list price of this system is \$1269.

The PCjr can take advantage of the world of software that has been developed for the PC. The 128K of memory may be limiting to some of the more spectacular integrated programs, such as 1-2-3, but most of the programs released for the PC can either run in or be slightly modified to run in 128K of RAM.

The ability to provide graphics that are



The gossip can stop—IBM's PCjr is out.

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D&N-80 CPU, D&N FL470 or OSI 470 controller, 48K memory at 0000-BFFF, 4K memory at D000-DFFF, two disk drive cables.

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You supply software on 8" diskette D&N will transfer OSI CP/M format to IBM 3740 CP/M format. Can also transfer IBM 3740 CP/M format to OSI CP/M format. Original diskette returned.

better than the Apple's, the ability to use most of the IBM PC disk-based software and the strong marketing appeal of the IBM name should combine to make the PCjr a formidable presence in the mid to low price range for computer systems.

Junior's Older Brother

The release of the PCjr didn't cause nearly the stir among the Fortune 1000 companies, governments and institutions that was caused by the release of its bigger brother, the IBM PC XT/370.

The XT/370 is difficult to describe in simple terms. It has at least three roles.

First, it is a powerful stand-alone multiprocessor microcomputer that can use MS DOS and CP/M software. Second, it's a sophisticated communications terminal that can interact with much larger mainframe computer systems. Third, it is also a unique desktop mainframe that is able to run programs under IBM's own VM (Virtual Machine) operating system.

The PC XT/370 gets this processing power from the use of three microprocessors added to the PC's standard 8088 main processor. The XT/370 uses two Motorola 68000 processors and an Intel 8087.

Like the 8088 found in every PC, the 68000 uses a wide addressing scheme internally to increase speed, but it uses a narrower external memory structure to reduce costs. But while the 8088 uses 16 bits on the inside and eight bits on the outside, the 68000 uses 32 bits internally and 16 bits in external addresses.

Word of this dual 68000 project leaked out of IBM months ago, but many people rejected the idea of IBM abandoning the Intel chip architecture (8080, 8086, 8088) after they bought a part of the company.

What we overlooked (because I was one who thought it was a red herring) was the new pragmatism of IBM. Intel is represented in the PC XT/370 in the form of the original 8088 and the 8087 mathematical processor, but the most powerful processing ability for the machine comes from the Motorola chips.

The PC XT/370 is also a strong bridging device. It bridges the world of MS DOS and CP/M-86 to the world of mainframe operating systems. The same machine will run the software that is familiar to readers of *Microcomputing* and programs designed for the larger mainframe machines.

Versions of the IBM VM operating system have been around for nearly 20 years. Twenty years worth of IBM 360/370 software is available to run with it.

Much of the IBM 360/370 software is primitive and awkward compared to off-the-shelf database, spreadsheet and decision-support programs available under MS DOS. Some of it is terribly expensive in contrast to the widely marketed MS DOS software, but many companies have sunk investment in

commercial 360/370 software and, most importantly, thousands of lines of debugged and familiar software to run on these systems.

If they can carry this code directly to a communicating desktop PC, they will have a total integrated system able to use the same programs from desktop to mainframe. The advantages in software compatibility, file structure compatibility and the ability to easily transfer data are great.

Low-Cost Relative

The PC XT/370 is relatively inexpensive. You can upgrade an existing PC XT with the 370 Option Kit for \$3790. A complete PC XT/370 sells for \$8995. This price doesn't include any VM software, but if you're in a managerial position where you rely on the IBM VM operating system for your mainframe computing, the addition of an XT/370 as a workstation or software development tool can be an economical investment.

IBM has taken the wise step of providing a clear path of progression from the smallest game-playing home device to a powerful machine able to run mainframe software.

IBM isn't the only bear in the woods, but it now has the strongest family.

Adam Osborne and
Osborne Computer Corp.
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daring and innovative
product for the time, and
the man gave momentum
to the entire industry.

Osborne Computer Corp.'s Collapse

As this column is being written, Osborne Computer Corp. is emulating a meteorite and disappearing in a puff of smoke.

A column with a name like Overview shouldn't let such a happening pass without comment, yet it's difficult to find a clear pointer to the problems of the bankrupt company. Like most post-ca-

tastrophe reports, any comments on the problems that Osborne is having must include many phrases that begin with the words "if only."

What if . . . ?

If only Adam Osborne had been able to make some of his plans come true sooner . . . Adam had many good ideas, like giving the Osborne 1 the powerful ability to read multiple disk formats, but the execution of the idea was somehow never as successful as the idea itself seemed. Improvement projects apparently became delayed by unforeseen circumstances that must have caused the cost to become more than the projected gain.

If only IBM had not become so successful so fast . . . Osborne had a clear market position in the pre-IBM world, but the presence of IBM surely complicated the marketplace and at least delayed what should have been "sure" sales.

If only Kaypro hadn't come out with a system having such a nice screen and keyboard at a competitive price . . . Osborne probably had the lead in software integration and initially in retail marketing, but the Kaypro display and keyboard are hard to beat.

If only the Executive had come out sooner so it could have run head-to-head with Kaypro . . . Instead, it took sales from the remaining Osborne 1 buyers and now is causing that machine to be sold at almost embarrassing prices. The Executive was not delivered in large enough quantities to fight Kaypro's lead.

If only the IBM adapter for the Executive had been ready to meet the market . . . IBM compatibility with the Osborne name and marketing base would have done well. Apparently, though, the IBM adapter is still not ready.

Finally, if only the company had gone public in the narrow window of time between the decline of national interest rates and the decline of corporate profits . . . The money available from a public stock offering and the broadened interest in the corporation would likely have saved it.

Kaypro and Eagle are certainly in much better positions because they went public. It seems likely that Kaypro is using the money in its coffers to finance PC compatibility for their systems.

"If only" is an easy phrase to use in hindsight. But actions and decisions are much more difficult to make in real time.

Osborne Computer Corp. may well come out of this rough time stronger than before, and Adam Osborne is certainly resourceful and resilient, but regardless of the outcome for both entities, the man and the company deserve a special place in the history of computing machines. The company made a daring and innovative product for the time, and the man gave a philosophy and momentum to the entire industry, and it's still apparent. We wish them both well. □

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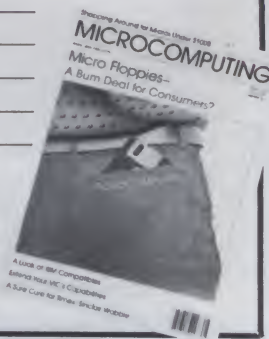
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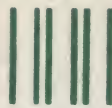
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Comdex/Fall—Las Vegas

The fifth annual Comdex show will take place November 28 through December 2 at the Las Vegas Convention Center and at three nearby hotels. The show will feature about 1500 companies exhibiting their wares.

In addition, a 52-session conference will focus on business, financial and marketing topics. Attendance for the five-day show is projected to be 75,000. For information and registration, contact The Interface Group, 300 First Ave., Needham, MA 02194 or call 617-449-6600.

Down by the River—California

Loma Linda University in Riverside, CA will be the site of the Riverside Computer Fair December 4. The show will feature educational, business, personal and home applications.

Manufacturers will be represented and local user's groups will be on hand to share information. Tutorial seminars and workshops are also in the works. For more information, contact Riverside Computer Fair, PO Box 8236, Riverside, CA 92515.

On-line in the Kingdom by the Sea

The seventh annual International On-line Information meeting will be held this year December 6-8 in London. A conference is slated to discuss major trends in on-line information retrievals as well as many other topics. Sessions will be held in four languages.

In addition, a debate forum will be held as well as product review sessions, manufacturer exhibitions and workshops. For further information, contact John Ozimek, Sales Promotion Executive, Learned Information, Besselsleigh Road, Abingdon, Oxford, England OX13 6LG.

The World of Commodore—Canada

Commodore Computer will host the World of Commodore computer show in Toronto, Canada on December 8-11.

The show is billed as Canada's first truly international computer gathering. There will be hardware and software exhibitors from ten countries as well as a host of international seminar speakers. For more information, contact Commodore at 3370 Pharmacy Ave., Agincourt, Ontario, Canada M1W 2K4 or call 416-499-4292, telex 06-525400.

Georgia on My Mind

Returning for a third year in Atlanta, the Southeast Computer Show will take place on December 8-11. An Office Equipment Exposition will be held in conjunction with the show.

This year, free seminars will be offered that cover different aspects of computer applications. For more information, call 800-368-2066 or, from inside Maryland, 800-492-0192, or write to Computer Expositions, Inc., PO Box 3315, Annapolis, MD 21403.

Paris in the Wintertime

EDUCATEC '83, an exhibition discussing the latest technology in education, will take place on December 9-15 in the Exhibition Halls of Porte de Versailles in Paris. The conferences will cover the role of microcomputers and data processing in education—this is a good opportunity for people wishing to establish links internationally.

Several countries will be represented and members of the French Ministry of Education are slated to appear. Several conferences and a technical symposium are also planned. For more information, contact: Edit Expo International, 4 Rue de Cheroy, 75017 Paris, France. Telephone 33-1-294.05.60 or Telex 641284 (EDIXPO F).

Computer Shopping—San Mateo

The Computer Supermarket Christmas show will be held December 10 and 11 at the San Mateo Fairgrounds, CA.

Retailers, manufacturers and distributors will be displaying their wares. There will be opportunities for substantial savings on micros, software and accessories for home and business applications. For more information, call 415-571-8041 or write to Microshows, PO Box 4323, Foster City, CA 94402.

Sauk Valley Computer Fair

The Sauk Valley, Illinois, Computer Club will host the Forth Annual Computer Fair January 14 and 15, 1984. The fair will be held at the Northland Mall, Rt. 2 in Sterling, Illinois.

For more information, contact Vinus Williams, Rt. 1, Mill-egeville, IL 61051; 815-625-8585 days.

UNIX in the Capital

UNIFORM, a user's group conference for people who use the UNIX operating system, will be held January 16-20, 1984 in Washington, D.C. The conference is being cosponsored by USENIX and Software Tools.

Meetings are to be held all week long, and exhibits are scheduled for January 17, 18 and 19. For more information, contact Mark Weber at Professional Exposition Management Company, Suite 205, 2400 East Devon Ave., Des Plaines, IL 60018; 800-323-5155 or, in Illinois, 800-312-299-3131.

Southcon and Mini/Micro in Florida

The Orange County Convention/Civic Center will host two shows January 17-19, 1984. Southcon/84 is billed as a High-Technology Electronics Exhibition and Convention.

The show will share the hall with Mini/Micro Southeast-84, which specifically focuses on computers. For more information on either show, contact Nancy Hogan or Kent Keller at 213-772-2965.

A Pack of Power And Complexity

KnowledgeMan: The All-Purpose DB System

Getting Personal

I've got a detective story/project for you this month.

Say you've been running PFS:File and PFS:Report quite a bit and have generated three databases with these programs. One has 44 records, one 23 and one 102. The programs have worked flawlessly with your two floppies, although somewhat slower than you'd like.

The holidays come! What do you find under the tree but an IBM Expansion Chassis with a hard disk and a memory board from Tecmar, and with a clock-calendar, extra serial port and 256K extra memory? Wow!

You hook it all up, copy all of your floppies to hard disk C:, install the device drivers for the clock and RAM disk to use that extra memory, and you're off. Everything works perfectly... *except* PFS:Report. It starts to print reports, all right, but then, somewhere in the middle, it dies with an I/O Error Number 7 message... that's not even in the PFS manual!

You've invested all that labor and now you can't even get at your data. Psssss... you can almost hear yourself deflate. You want to smash the machine and the idiots who wrote the PFS program that won't run right on a hard disk.

Question 1: What's wrong? Question 2: What do you do and in what order? (Hint: there is no bug in PFS:Report.)

We'll publish some user responses next month, and reward (purely subjectively, of course) a software package to the best response.

This month, I have a load of packages—as well as John Schnell's MM.PRg dBase-to-MailMerge converter—to review.

Database Management

KnowledgeMan, a DBMS with spreadsheet capabilities, outperforms dBase II in functionality. It also outdoes dBase in complexity, which should give you an idea of its power on one hand and the necessary time investment on the other.

KnowledgeMan offers as many records as dBase can handle (65,535), but with up to 255 fields per record. Each record can have 65K characters in it, too, as can any one field. So, in theory, you could file entire manuscripts of 20–30 pages as a single KnowledgeMan record.

Don't Peek

KnowledgeMan also offers mainframe-like data security (by access to the program itself, by file and even by field in a record), and encrypts your data file so that little eyes don't peek where they shouldn't. It has automatic data checking, limited automatic filing and good reporting abilities (*ad hoc* and structured).

For instance, KnowledgeMan automatically computes statistics (count, sum, minimum, maximum, average, standard deviation) on your database, and it holds these in variables you can manipulate at will.

Similar to dBase, KnowledgeMan has a "picture"-generating ability that allows the user to create data entry and retrieval of print forms in any way he'd like. Best of all, output and input can be done in user-controlled colors, including blinking, high-intensity and eight foreground/background combinations.

If all that isn't enough, KnowledgeMan includes its own spreadsheet, where the results of database searches, for instance, can be automatically "stuck" by the program to allow further manipulations that only a spreadsheet can provide.

KnowledgeMan's spreadsheet has automatic label spillover, windowing, full color control (you can really be "in the red") and some high-level contingency programming options. KnowledgeMan supports, in both DBMS and spreadsheet modes, full macro capabilities, one- and two-dimensional array manipulation (students by grades, for example) and a host of other features.

The "price," other than the \$500 you'll be asked to part with at the cash register, is best paraphrased from a letter the KnowledgeMan people sent to me. KnowledgeMan, they note, may not be as easy to learn as other programs, although it's

easy to use.

Further, while it's "not aimed *directly* at the first-time computer user," future tutorial aids will allow even first-timers to use it in a "few hours." Well, "few" means 50 or so hours. You really *work* to learn this program; the documentation's turgid, the manual-based tutorial is skimpy and the program is complex.

But if you learn it, I think it'll repay you handsomely in functionality. It is, at my current level of learning, very, very good.

"Good" is a funny word, though. I speak to you as a jaded user and as someone who has mucked about in more incomprehensible manuals than I'd ever care to remember.

Fast Facts Facts

If you don't like the learning time expended, let me recommend a DBMS on the opposite end of the ease dimension: Fast Facts. Released by the Innovative Software people of TIM and Fast Graphs fame, Fast Facts goes beyond these already good programming efforts in my opinion.

In addition to all the regular DBMS features you'd expect from a full-function database manager, Fast Facts offers an in-program calculator, a mail list programmer, a fine on-screen (and on-paper) forms designer, automatic data corruption correction and a surprisingly extensive report generator.

The latter is a library-based system; you design report formats for a "file library" and then call them up as wanted with any file. Long text items are supported, sorts are done well, numbers are formatted with commas and dollar signs, and a nice statistical pack is included.

As with all of its programming efforts, Innovative goes to great lengths with useful utilities, including ones to read or write

Address correspondence to Thomas V. Bonoma, 45 Drum Hill Road, Concord, MA 01742.

ASCII files as well as with the DIF format. The manual is a miracle of clarity, and the program (with example files) is a joy to use.

Thank God It's Friday!

Friday! is Ashton-Tate's entry into the customer-segment characterized more by Fast Facts buyers than KnowledgeMan ones. Friday! uses the new dBase II Runtime package to give the user a much simpler (but less functional) subset of dBase. It's solid, but it keeps some of the disadvantages inherent in its big brother while losing some of the advantages that are found there.

On the plus side, Friday! is completely menu-driven and presents a short and concise set of alternatives from which the user can choose. Additionally, Friday! files are fully compatible with those of dBase—a major plus.

Data file design has been simplified greatly in Friday!; you need only decide whether your data is "numbers" or "anything at all" if the field is not a "yes/no" one. The difference between the first and second categories is that mathematical manipulations can be done on numbers. And, if you just want a quick and dirty data entry screen, Friday! will manage the entire formatting process in a pleasing way (same as dBase).

However, Friday! drops the browse function, one of the most useful in dBase, and restricts entries to 55 characters per field (32 fields per record), a disadvantage for both dBase file compatibility and long text entry. Additionally, the program is fairly slow, and a profusion of menus can get between user and use.

On the other hand, computed fields, dBase's search capabilities and "picturing" forms are well-supported in Friday! in a very friendly way. You can even write form letters (unjustified, and a lot of work for the result) with the screen layout feature. And labels are a snap. Some of the "extras" in Friday! are real god-sends, like a good computed-field capability, a clear and useful menu structure and default responses for all prompts.

Essentially, what we have in Friday! is a solid menu-driven subset of dBase II. You wouldn't believe the manual that came from Ashton-Tate; it includes a glossary and handy fold-outs of each major instruction. And, each message given by the program is keyed with a number to a "prompts" section in the manual, which explains everything about it there is to know.

I think reviewers will be hard on Friday!, but unjustly so. Their tendency (and the one I'm fighting here) is to compare it to dBase, to say "it doesn't do everything its brother does" and to look for flaws. Looked at the opposite way—as a DBMS for the first-time organizer—Friday! is a fine program with a few restrictions it shouldn't have, but it has a friend-

ly way of relating to the user.

The program is supplied with sample files that are truly useful in figuring out how the program works. I think it will, and should, sell very well.

Word Processing

Sick of high prices, mail merges and complicated stuff? Then how about

B-Writer, a \$39 text processor written in BasicA (a compiled version is supplied too).

B-Writer

Now, you're going to have to make some concessions with this baby—like telling it how many "screens" you want to write before writing, and having only a

```
Multi                               Part                               Headers

                                     Date: 8-30-1983
1  WHAT BLUE DOES

Blue is a color word processor for the PC which can
edit files up to 64K in length. It is, like many of the
popular processors, made up of a screen editor and
formatting program. The former is for entering text;
the latter for printing it with associated special
effects (numbered lists, automatically set-up
appendices, etc.).

2  TEXT EDITOR

The text editor has a full complement of movement
commands, smooth scrolling, and a number of
"convenience" features which aren't absolutely
necessary to text editing, but which sure do help:

1. Keyboard macros (entered while interactively
   editing);
2. facility to input extended ASCII characters;
3. auto time display;
4. a "bookmark" (i.e., a single file marker);
5. an on-line directory of disk;
6. a "mode" command...you can work with lines or words;
7. a stack buffer for deletions/"undo"/copying;
8. 8, count 'em, 8 separate text windows allowing 8
   files to be edited simultaneously;
9. on line help.

3  FORMATTER

The text post-formatter has a command set more
extensive than many; maybe about 1/3 as extensive as
The FinalWord. Nonetheless, it gets the job done
just fine. Included are commands to automate all the
usual functions, like bolding, underlining, headers
and footers (but no first-page omit on headers and
footers), but also:

a) footnotes, sort of (see below);
b) automated chapter, section and appendix titling
   and numbering;
c) include files;
d) automated title page formatting;
e) auto date stamping from the DOS system wherever
   you want it;
f) macros, including author's name.

So, what doesn't it do? Super and subscripts?
Nope, it's got those see?, and in addition, many
-----
1 Blue Word Processor, Symmetric Software, Inc., 2005
Balboa Blvd., Suite 256, Newport Beach, CA 92663
$150.00, manual only $25.00, demo disk $10.00.

Footer                               1                               8-30-1983
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Fig. 1. A sample of the Blue word processor, IDS Prism.

line-oriented editor. You get, however, automatic centering, left or right justification, complete integration with the arrow and cursor keys and even a help screen.

B-Writer is equipped with many print options, such as underlining and emphasis, compressed or double-wide print. It even has a file-include option.

This program is well-done, although WordVision (at \$50) is certainly a much better product. However, B-Writer is supplied with source code, and it makes a fascinating excursion into learning about programming if you play with and modify this package (you're allowed).

I'd spend \$40 on this before I would on many games—it can teach a lot.

Software Blues

Fig. 1 shows some sample output (IDS Color Prism) from Blue, an interesting and solid word processor just released by Symmetric Software.

Blue runs in color, uses a separate editor and "formatter" (i.e., print program) and supports many of the features (footnotes, eight separate windows, on-line help) of the big boys.

About the only faults I can find with Blue are that it has no mail merge facility, no speller (which is no real problem—get The Word+) and no math numbering or autonumbering of footnotes.

On the other hand, you'll absolutely love Blue's smooth scrolling, color implementation and simple printer configuration file. And Symmetric will send you a demonstration disk for \$10 if you don't believe me.

More from Muse: Super Text

Muse Software's Super Text, like PIE Writer, is an Apple II born-again word processor. It's delivered on a single disk with a set of function key stickers, a reference card and a clear manual (but no tutorial of any sort and no index in the manual).

Super Text is a competent screen-oriented text editor that mostly shows what you'll get on the printer as you type it in (like WordStar). It's very, very well-integrated with PC cursor controls (e.g., ESC-right arrow moves to the end of the current line), and it makes good use of ten of the PC's 50 function keys. Screen scrolling is generally smooth, except when you're at the bottom of a screen and you want to go down a line—then it's a little slow.

The program supports the usual block move, extract and delete options we've come to expect. Additionally, it's got a couple of exceptionally nice features I didn't expect, like multiple search and replace. With this feature, you can tell Super Text that you want to find A, B and C, and replace them with D, E and F. Pretty nice.

Even better is AutoLink, whereby you tie files together as in "include files" in

other word processors. What's so "better" about that? Well, searches in edit, for instance, work through all of your linked files at once, so you can be editing chapter 1 and search through to chapter 9 for a section you know you wrote but can't find. Super Text also supports split-screen (one split only) editing, which is nowhere as extensive as Blue's nine screens, but still useful.

Print formatting (a narrow range of printer configurations are presupplied, but it's easy to configure for others) is done via a single nine-item format line inserted anywhere in the file. Or you can specify a global print format from the print menu.

Super Text also allows you to format disks from within the program—a handy feature.

Muse Software's Super Text is an Apple II born-again word processor.

As with Blue, Super Text has no speller. Additionally, it has no way to handle footnotes or super/subscripts (unless they are engaged by print macros at print time). You don't get color on a color monitor with Super Text, and, since there's no manual index, you can page for a long time before finding what you want.

At \$100, though, Super Text is a value for the money. If this baby had a mail merge feature, that AutoLink stuff would make it worth its weight in gold.

Programming

Shelly Gerstein is the author of Active Trace, a marvelous Basic programming aid I have a strong interest in. I helped a little bit as Shelly got the program to run bug-free under every kind of DOS revision.

Active Trace consists of three programs—two mundane and one stellar.

On the mundane end are VREF and GOREF. The first creates an alphabetized list of program variables and every line in which they occur. GOREF works similarly to VREF, but creates a numerically ordered map of every line that is called (by a Goto or Gosub), and where the call occurred. (This isn't so mundane, come to think of it, if you've ever spent half a night trying to figure out subroutine flows.)

The stellar part of Active Trace is Scope, which reads your program and creates a new version that lets you see inside the program as line numbers and variable values change.

It's similar to Basic's Tron command, but instead of just line numbers, Scope prints the value of all of the variables in your program as well. Not only do you

learn how to fix your programs, but you learn to understand them.

It's just amazing to watch a program you wrote run under Scope; debugging becomes at least doable, if not trivial.

/HELP!

Need more help with Basic programming? How about /Help, a reference manual (on disk) of Basic commands that you can call up with a keystroke while you're programming in Basic?

/Help runs on the Compaq and the PC, loads itself out of Basic's way (but needs at least 128K to help you) and comes up in Basic whenever you press the slash key.

Type in that you want help with something, like MID\$, and it searches its file to give you a half-screen summary of how the command works, at least one example of the command in use and available cross-referenced topics.

Better yet, the IBM Basic reference manual page number where the command is described is also put up on the screen. You can even get help on the meaning of Basic error messages when your program generates them.

/Help in no way contains reference to all of Basic's commands, but it can get you going with many of them. If you find using your manual tedious, /Help may be useful to you. Alternatively, you can look stuff up in that manual they gave you and spend your money (and RAM) on something else.

VEDIT

If you've ever thought about a program (or a writing) editor, think no more. No, not IBM's Personal Editor; that doesn't measure up to VEDIT.

VEDIT is from the old days of microcomputing, but I hope it will be around for years to come. To see it on the 8086 is a joy for me, since I know people who have written entire books, not to mention programs, with it.

VEDIT uses two modes: visual, in which the program works like any other screen editor, and command, where you load or save files, search and replace files and so on.

So what? So, in visual, you can redefine the keyboard totally to execute any one of the VEDIT commands your way. For word processing, VEDIT has word wrap, adjustable margins and paragraph reformatting. It allows embedded print controls but not proportional printing. There are ten text buffers available to the user all at once, allowing almost awesome cut-and-paste flexibility.

In command mode, you can create command macros that customize these often repetitive functions to your style and needs. Best of all, VEDIT is a virtual text editor, which is to say that only your disk space limits the file size you can edit. The extensivity of VEDIT's command set means that it requires some use to get used to; but, an on-line help facility



PERSONAL ROBOTS

Peripherals and Software for Personal Robots

NEW

VOICE COMMAND SYSTEM FOR HERO

MICROMATION proudly presents a new peripheral for HEATHKIT'S® HERO-I robot which elevates the robot to a new level of sophistication. We call this peripheral a Voice Command System (or VCS) because it not only consists of a voice recognizer, but also an advanced level machine language program for the robot which actually allows you to program robot movements by voice. We call the voice recognizer VOREC and the voice driven program VOCOL (VOIce COMmand Language). Highlights of these two important parts of the VCS are described below.

VOREC

VOREC is a powerful, microprocessor controlled, speech recognition board which mounts next to, and interfaces with, our HERO-I MEMCOM BOARD. The recognizer has the following principal features and specifications:

- Speaker-dependent recognizer with nearly instantaneous word recognition rates.
- Recognition accuracy about 98%.
- Vocabulary of up to 256 words (stored as 16 word groups with 16 words in each group for greater recognition accuracy).
- 16K of onboard static RAM of which 14K is battery backed to retain recognized word parameters during power down.
- RS232 port for receiving commands from, and reporting status and words recognized to, the host (HERO).
- Highly sensitive audio input circuitry requires only an external speaker for audio input rather than a microphone. (This allows robot to receive commands from up to 15 feet away.)
- Utilizes state-of-the-art high speed (HC) CMOS chips and the new CMOS 65C02 microprocessor for ultra low power consumption. Complete board consumes an incredibly low 45 ma while active and 1 ma when inactive.
- Speech recognition is accomplished by a software algorithm contained in a 2K EPROM. (Future product updates will require only replacement of this EPROM.)

The Voice Command System manual contains a complete description of how to use the VOREC board under program control from HERO. The 6808 Source Code for VOCOL is available on an APPLE® DOS 3.3 disk at additional cost. This source code is compatible with the SC-6800 CROSS ASSEMBLER.

VOCOL Source Code **\$55.00** (not sold separately)

VOCOL

This software is even more amazing than the voice recognition hardware. VOCOL is like a high level language for the robot (such as BASIC) which supports both deferred and immediate execution modes. The only difference is in BASIC you "write it," and in VOCOL you "speak it." The software is provided on an EPROM which plugs into a memory socket on our HERO-I MEMCOM BOARD. VOCOL has the following principal features:

- When first run, the robot talks to you through a voice training session in which you are asked to repeat words in his command vocabulary three (3) times.
- Following this training session, you can literally talk in a program of movements for later execution, or command immediate movement by voice.
- The robot prompts you for a command and when received, repeats it back to you for verification. If verified and if in immediate execution mode, the robot will execute the movement. If in deferred execution mode, the robot proceeds to write a machine language program in his memory for later execution. When your program of movements is complete, you signify this with a "STOP" command. A "GO" command will then cause the robot to execute the program it wrote in memory. After execution, the robot returns to the command mode.
- Complete instructions and installation manual.

TOTAL SYSTEM PRICE \$595.00

NEW

POET

This is an Artificial Intelligence program similar in concept to STORYTELLER, but more advanced. The program uses an advanced self-programming technique which allows the robot to speak self-generated, random three line Haiku poems on an endless list of subjects. After HERO speaks a poem and likes it enough, he will make a comment about it or do some meaningful body movement.

PRICE: TAPE (machine code) \$20.00

PRICE: DISK (source code) \$30.00

HERO MEMCOM BOARD

This product provides a means to develop programs for the robot using a personal computer, and expands the robot's memory with an additional 30K of RAM. This product includes:

- Two 8-bit bi-directional parallel ports with handshaking lines for superfast data transfers between the robot and a computer (connects directly to our APPLE-HERO COMMUNICATOR board), plus two 16-bit timers.
- An RS232 serial port for two-way communications between the robot and any computer having an RS232 serial port.
- Serial communications software in an onboard EPROM which allows uploading/downloading of programs via the serial port.
- Complete instruction manual and schematics.

PRICE \$295.00

APPLE-HERO COMMUNICATOR

This product provides the hardware and software necessary to implement two-way high speed parallel communication between an APPLE® computer and a HERO-I robot equipped with our HERO MEMCOM BOARD. It includes:

- A peripheral card for an APPLE that contains two 8-bit parallel ports with handshaking lines, and two 16-bit timers.
- Data transfer software for the APPLE board and for the HERO MEMCOM BOARD burned into two 2716 EPROMS. These programs provide ultra fast two-way communications.
- A disk containing heavily commented 6808 and 6502 source codes for the communications software. These source codes are compatible with the S-C MACRO ASSEMBLER and the S-C 6800 CROSS ASSEMBLER available for the APPLE from the S-C SOFTWARE CORPORATION.

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things a lot better.

Take a look at it; you'll see why thousands of users swear by it, and are even using it as their only editor while buying text post-processors to finalize their output.

The Super Star Difference

Want to know the difference between WordStar 3.24 and 3.3? Super Star, that's what.

Super Star lets you configure your WordStar 3.2x version for foreground and background color selection, set up default editing parameters, define the ten function keys and select printer control settings. The program works well, is clear even with no documentation and is copyable.

The problem, of course, is that John Schnell's WSCONFIG.BAS program, found on Volume 1, Number 1 of the PC Disk Magazine, does almost everything Super Star does, and you get a number of other programs as well.

This isn't an endorsement for PC Disk Magazine; we'll review three disk magazines next month. It is, though, a problem for the Super Star people, who have written a solid WordStar configuration utility that Schnell coined at the same time.

If you're a WordStar user, you should have one of these programs.

Lauding Waterloo Logo

Not in the utility class—or even in the editor class—is Waterloo Logo, an implementation of Logo with a clear manual and reference card.

Waterloo Logo needs a color card and monitor; given those needs, though, it does a fine job with turtle graphics, sound and even point graphics and color manipulations.

If you're tired of Basic and want to branch out into another language, Waterloo Logo's tutorial will get you going.

A Trio of Project Managers

Three project management programs in the same month? I'm going crazy from Gantt charts!

Project management involves techniques for scheduling tasks, which are a part of grander projects. Tasks have well-defined beginnings and ends and somewhat predictable duration and costs. Milestones are specific events that are objectively describable.

Knowing these two things, any project can be decomposed into tasks and milestones. The advantage of such decomposition is that the interrelationship of tasks can be studied and controlled to maximize certain variables (e.g., completion time) or minimize others (e.g., staff or total costs).

Harvard's Project Manager

There. Now that you know that, we can

look at the Harvard (Harvard, MA, not Harvard University) Project Manager, a slick project scheduler.

Project Manager does critical path analysis and PERT charting with extensive PC text graphics to provide nice project flowcharts. The program also can display any project as a bar chart, showing when each task begins and ends.

The system is interactive; as you refine the definition of your project, Project Manager recalculates and redisplay total project costs, duration and graphics. The program has an on-board calendar function that lets you define special holidays, vacation schedules or any other strange requirements implicated in your project.

Additionally, Project Manager lets you schedule slack time so that you can start tasks with slack later and you still won't delay the project. This, of course, can reduce manpower requirements.

The program has extensive tracking abilities as well; these abilities let you monitor project execution as it moves from planning through completion.

Several other functions make this product a worthy entry in the project management race. You can print your flowcharts or other data as wall charts if you'd like.

The Project Manager supports multiple split-screen capabilities so that the description of a task and the flowchart, for instance, can be on the screen at the same time. A subtask facility is supported for jobs that are themselves composed of many smaller ones.

The program shows great coding care; for instance, there is an integrated set of eight demonstrations and an execute function in the program itself. Execute allows the demonstrations to be run at will.

The manual, one of the shortest I have seen for what it covers, is also one of the best; it's a pleasure to read.

The Harvard folks have done an outstanding job with their project scheduler, within the limits of the application needed by managers (see below).

MicroGantt

MicroGantt doesn't have all of the graphics features of Project Manager, but it's an excellent Gantt-charting implementation, especially if you need task and subtask costs, work hours or personnel requirements easily at hand. Whereas the Project Manager's strengths lie in its graphics and ease of use, the strengths of MicroGantt are in options that Project Manager doesn't offer, such as assigning people with different skill levels and different hourly (or project) wages to tasks and then seeing "what if?"

Similarly, MicroGantt breaks up costs into fixed and variable ones, a sought-after feature. And, matrixes of task by date, showing personnel requirements,

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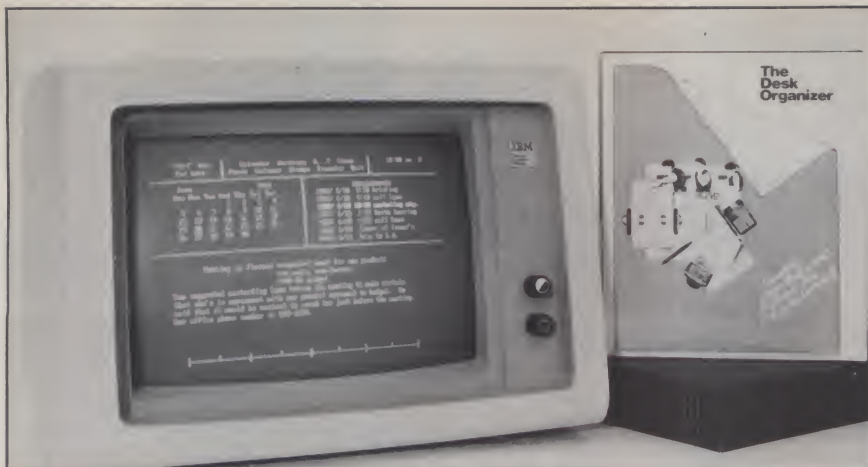
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The Desk Organizer features the "meta" command, which allows access to the program—without rebooting—while it's "sleeping."

variable and fixed costs for any project, are readily available. MicroGantt also has subtask capabilities and a clear menu structure.

While its manual is not as easy to read as Project Manager's, and no graphics are

used (there are no flowcharts, and only letter-based Gantt charts), MicroGantt permits significantly more decomposition of costs and people. For some applications, MicroGantt may well be the better program.

Listing 1. John Schnell's MM.PRg program.

```
*****
** DBASE-MM.PRg - JOHN SCHNELL - 1983 **
** program to convert dBASE.DBF files to MAILMERGE.TXT files **
**
** datefile needed: TEMPLATE.DBF (zero records) **
** one fieldname: CONCAT,C,100 (increase size up to 254 **
** characters, to equal maxlength field) **
*****

ERASE
SET TALK OFF
SET ECHO OFF
SET BELL OFF
SET CONFIRM ON
SET DEFAULT TO B:
CLEAR
STORE 100 TO maxlength

*****
* get name of file to convert *
*****
STORE F TO ok
DO WHILE .NOT. ok
  STORE ' ' TO filename
  @ 01,05 SAY 'Enter name of dBASE file to convert to MAILMERGE file';

  GET filename
  READ
  ERASE
  @ 01,05 SAY 'Insert diskette with .DBF file into drive B:, push any
key'
  SET CONSOLE OFF
  WAIT
  SET CONSOLE ON
  IF FILE('&filename')
    STORE T TO ok
  ELSE
    ERASE
    ? CHR(7)
    @ 01,00 SAY '!! Sorry, only these .DBF files are on this disk,';
    ? ' + please try again !!'
    ?
    LIST FILES LIKE *.dbf
    STORE 100 TO delay
    DO WHILE delay > 0
      STORE delay-1 TO delay
    ENDDO delay > 0
    ERASE
  ENDIF FILE('&filename')
ENDDO .NOT. ok
```

Graphics Project

Conceptually Project 6 is almost exactly in the middle between Project Manager and MicroGantt. It uses some PC graphics, and it runs exceptionally well in color and adequately in monochrome. It allows some breakdown of task costs into smaller units, and it uses "resources," a clever concept that allows your tasks to be comprised of people at a certain wage.

Like MicroGantt, Project 6 has no flowcharting abilities, but like Project Manager, it uses user-defined character graphics to produce a bar chart of the project. If you run it in color, the critical path will be in red, which is a good idea. The manual as well is "in between"; it doesn't have Project Manager's clarity but is easier to follow than MicroGantt's documentation.

Take Your Pick

This is the first time in a year of writing this column that I can honestly say I think you have three excellent software choices. Each of these packages is stellar in its own way.

If I were a general manager with normal general management problems, I'd pick Project Manager or Project 6 for their clarity and ease of use. If I were a project manager, MicroGantt would win hands-down, because its personnel and costing abilities far outstrip the capabilities of the other programs.

If I did a little of each, or just wanted a solid PERT-charting implementation for personal as well as business use, I'd pick up Project 6.

Isn't it nice to have a choice for a change?

Desk Organizer

Remember, you read it here first!

The Desk Organizer, from Conceptual Instruments Co., will vie for the most useful software package title with all serious users. The Desk Organizer is just that; a complete desk organizer that puts my little Desktop program to shame (but fear not—revision 2 is in the works!).

By the way, I'm not pricing differently here and on the Source. Desktop should have been \$25, not \$20. But, since I made the mistake, you can get it for \$20.

The Desk organizer has a nearly infinite calendar, a clock and an alarm, all always visible in the upper corner of the screen, and multiple "rolling indexes" in which you store information.

The upper half of the screen is taken up by the calendar and index information; the lower half is taken up by a 12-line "notepad" where you jot notes then file them in one or another index. For example, on my system, there's an index for appointments (filed by time and day/month/year), one for names and addresses, one for "to-do" items, one for ar-

More →

ticles I've read and one for special printer controls (more below).

To file an item, I just type it into the free-form notepad space (see photo), choose the index in which I'd like it and then enter a label for it. If it's an appointment, Desk Organizer helps me with the labels so that they're all consistent. And, if I want an item cross-referenced by a company and person's name, for instance, that's available too. The appointment index is hooked into the clock so that the alarm can go off each time I have an appointment to keep.

Miraculous Integration

So what? Is this another time manager program that looks useful but is actually worthless? Nope. The miracle of Desk Organizer is its integration.

What if I want to call one of the people in my name file? Recall the message, and dial the phone, right? Nope. With a Hayes modem, hit P and the machine calls the number for me!

What if I want to enter an appointment, or my own name, repetitively on a note? The Desk Organizer has ten "stamps," or macro commands, that give me one-key entry of frequently used phrases.

I even keep an index of special MX-80 print commands for expanded text and the like, so that when I want something in a note printed in a compressed fashion, I just call up the index and insert the control code (filed like any other note) into my notepad.

If you do a lot of math with your clients' index, Desk Organizer just happens to have a full-function calculator (four-function) that can automatically put the results of calculations into my notepad and can compute equations that you enter from the notepad!

All of this would make Desk Organizer extraordinarily impressive, but quite useless. Why's that? Well, I don't know about you, but I can't see leaving a \$5000 computer in the service of a calendar program all day. I have other things to do with my machine, but I need access to my calendar and appointments whenever I want—without rebooting.

With Desk Organizer's "meta" command, that's just what you've got (as long as you have more than 128K of memory). Meta puts Desk Organizer to sleep and allows you to do anything else you'd like with the computer.

The program may be sleeping, but isn't gone because it will politely interrupt you with a mellifluous chime if you have an appointment.

If you think these meta commands are restrictive, how about the ability to reboot the machine? I used meta, put a DOS 2.0 master in the machine, and lo and behold...everything I had before was there again, while Desk Organizer slept.

When I got done with The Final Word, I just hit CTRL-Break, and there was Desk

Listing continued.

```
*****
* read file structure and get fields to convert *
*****
ERASE
SET CONFIRM OFF
? '=== Retrieving database record structure ==='
USE &filename
COPY STRUCTURE EXTENDED TO tempstru
USE tempstru
STORE F TO ok
DO WHILE .NOT. ok
  STORE 0 TO count
  STORE 2 TO offset
  STORE 0 TO length
  GOTO TOP
ERASE
@ 01,01 SAY ' FIELDNAME / TYPE / LENGTH ';
+ '- Please identify fields you wish to convert.'
DO WHILE .NOT. eof
  STORE 'N' TO include
  @ #+(offset),01 SAY str(%,2)+' '+field:name+' '+field:type+'
;
+STR(field:len,3)+' -- Include in MailMerge file (Y/N) ';
GET include
READ
IF !(include) = 'Y'
  IF field:type = 'C'
    STORE 'var'+STR(count+10,2) TO variable
    STORE field:name TO &variable
    STORE length+field:len TO length
    STORE count+1 TO count
  ENDIF field:type = 'C'
  IF field:type = 'N'
    STORE 'var'+STR(count+10,2) TO variable
    STORE 'STR('+field:name;
    +','+STR(field:len,2);
    +','+STR(field:dec,2)+')' TO &variable
    STORE length+field:len TO length
    STORE count+1 TO count
  ENDIF field:type = 'N'
ENDIF !(include) = 'Y'
SKIP
IF # = 20
  ERASE
  STORE -19 TO offset
ENDIF # = 20
ENDDO .NOT. eof
@ 24,10 SAY 'Is the above correct ???';
GET ok
READ
IF length > maxlength
  STORE F TO ok
  ERASE
  ? CHR(7)
  ? 'Concatenated string too long, ';
  + 'eliminate'+STR(length - maxlength,3);
  + ' characters from selected fields'
  STORE 100 TO delay
  DO WHILE delay > 0
    STORE delay-1 TO delay
  ENDDO delay > 0
  ERASE
ENDIF length > maxlength
ENDDO .NOT. ok
USE
DELETE FILE tempstru

*****
* convert fields to one concatenated field in tempfile *
*****
ERASE
? '=== Creating tempfile ===='
?
USE template
COPY STRUCTURE TO tempfile
USE
ERASE
? '=== Creating concatenated records ===='
?
SELECT PRIMARY
USE &filename
SELECT SECONDARY
USE tempfile
SELECT PRIMARY
GOTO TOP
DO WHILE .NOT. eof .AND. count > 0
  STORE '' TO m:concat
  STORE 0 TO loop
  DO WHILE count > loop
    STORE 'var'+STR(loop+10,2) TO variable
    STORE &variable TO variable
    STORE m:concat-&variable TO m:concat
    STORE loop+1 TO loop
```

More

Listing continued.

```

IF count > loop
  STORE m:concat-"," TO m:concat
ELSE
  STORE m:concat-"" TO m:concat
ENDIF count > loop
ENDDO count > loop
SELECT SECONDARY
APPEND BLANK
REPLACE concat WITH m:concat
? m:concat
SELECT PRIMARY
SKIP
ENDDO .NOT. eof .AND. count > 0
SELECT PRIMARY
USE

*****
* copy concatenated .DBF file to .SDF/.MM file *
*****
STORE F to ok
DO WHILE .NOT. ok
  ERASE
  STORE " " TO mmfilename
  SET CONFIRM ON
  @ 01,05 SAY 'What name do you want for the MailMerge .TXT file ? ';
  GET mmfilename

  READ
  SET CONFIRM OFF
  @ 03,05 SAY 'Is '+(mmfilename)-'.TXT correct (Y/N) ' GET ok
  READ
ENDDO .NOT. ok
ERASE
@ 01,05 SAY '!(mmfilename)-'.TXT file now being created, please stand-b
y'
SELECT SECONDARY
COPY TO &mmfilename SDF delimited with ,
USE
DELETE FILE tempfile
ERASE
@ 05,05 SAY 'dBASE to MailMerge file conversion is complete'
SET INTENSITY OFF
CLEAR
RELEASE ALL

```

Organizer, ticking away. The "meta" ability makes this program just about the most useful thing to come around for the manager since 1-2-3, or maybe it's better, since you can run 1-2-3 from Desk Organizer.

MM.PRg

This month's program comes to us courtesy of John Schnell of the New York Personal Computer Club. John is rapidly gaining fame as a program writer.

In case you hadn't guessed, MM.PRg converts dBase files to ones compatible with WordStar's MailMerge program. It's really a useful utility.

MM.PRg requires only that you call up dBase and define a new file, TEMPLATE.DBF, with one fieldname, CONCAT. As Schnell indicates, make CONCAT a character field (C) with a size equal to the largest field you'd like to translate (100 with do for most users). Then, just do MM.PRg from within dBase and follow the prompts.

I think you'll really be impressed as well as interested in just how much can be done with dBase's own little programming language.

Schnell has OKed our offering MM.PRg (and other programs from this column) to you, as per our usual practice. Send me a disk, mailer and \$10 to cover costs and we'll send it out. Happy Holidays. □

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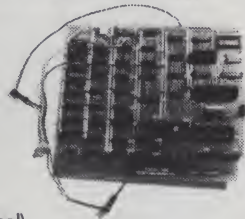
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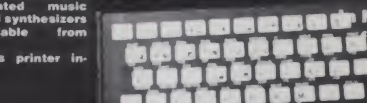
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Hello, Noah here. Recently I got a contract to build this fellow a large boat. It seems he wants to collect two of each animal and make a floating zoo of some sort. So, in order to keep track of all the building materials and converting everything to cubits like he said, I got a minicomputer. But, with all this rain we have had lately, the power to my computer has been terrible. Every day for the last 39 days I have lost data every time the light blinked. So I got a **MAYDAY** Uninterruptible Power Supply from **SUN RESEARCH** up there in New Hampshire. Takes all the surges and spikes out of the line and keeps me running during those blackouts. So now I can keep track of all the animals and how many of each I have (those rabbits will drive you foolish) and keep track of all the different supplies (those elephants will eat you out of house and home). I have also hooked my phone system into the **MAYDAY** so I can keep track of incoming calls during those blackouts. The Boss gets really angry when He can't get through...more lightning. I was building this boat in my cellar, but the wife got tired of moving it around and said, "Get that ark out of here." "Ark". I kind of like that name.

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Richvale Telecommunications (10610 Bayview Ave., Richmond Hill, Ontario, Canada L4C 3N8) offers a wide collection of products for various Commodore systems that are carried here in the United States by a number of distributors and dealers. From the few samples I've seen they appear to produce quality products that are well-documented.

Linked with Character

The company's most interesting product is the C-64-Link cartridge for the Commodore-64 that lists for \$169.95 retail. It provides your C-64 with a number of characteristics and features normally found only on the more expensive PET/CBM series of microcomputers. Unlike other interface devices, the C-64 Link has no switches to set. It simply plugs into the cartridge port and provides Basic 4.0 features at power up.

The C-64 Link gives you an IEEE-488 bus interface so you can use any PET/CBM peripheral, like the 4040 or 8050 high-capacity disk drives. You can even intermix serial, parallel, and IEEE peripherals when they are all connected to the C-64. Additional Basic commands are added to the operating system to allow selection of which peripheral interface is to be used.

Once the C-64 Link is installed, all you need is a standard PET-to-IEEE cable to connect the first IEEE peripheral. Standard IEEE-to-IEEE cables can then be used to daisy chain additional peripherals.

Special cables are also available for interfacing a parallel printer via the VL-3 cable; standard RS-232C modems via the VL-4 cable; or standard RS-232C serial printers via the VL-8 cable. Each of these cables is connected to the Commodore-64's user port and the C-64 Link provides the necessary support software.

Besides the additional interfaces, you also get a number of new Basic commands normally found in Commodore's Basic 4.0 in the PET and CBM systems. This includes the 16 DOS commands for

Header, Copy, Catalog, DOpen, DClose, Rename, Scratch and so on. You also get a built-in machine language monitor just like in the PET/CBM systems.

There's also a built-in modem program which may not be fancy but does work well. It will support the VIC-modem or an external standard RS-232C interface modem connected to the user port using the VL-4 cable. It simply makes the Commodore-64 emulate a dumb terminal with no file transfer or printer output capabilities.

A special relocater program is supplied on tape along with an information program that explains various ways the cartridge can be used. The relocater allows you to combine disk and printer types, convert CBM ASCII characters to true ASCII for most parallel printers and save selected settings for the next time the relocater is used.

Keep in mind that when the C-64 Link is used, you lose 8K of Basic program space. This loss of memory space or the difference in ROM software may make the cartridge incompatible with some software packages. By relocating the C-64 Link software you can usually overcome this drawback. The relocater program allows six options on where and how you want the C-64 Link software relocated.

You can relocate the C-64 Link software to reside starting at \$B000, under the Basic memory, where it's invisible to the C-64 operating system. This only requires 512 bytes from Basic at \$7E00, \$8E00, or \$9E00; or above Basic at \$C000 or \$CE00.

Alternately, the entire C-64 Link software can be stored at \$C000. Relocating to either area doesn't destroy the functionality of the C-64 Link.

Another relocation option is to copy the Basic and kernal ROMs and then modify all serial and disk routines to support IEEE devices. The normal ROMs are then disabled to use the new routines. When this method is used, the machine lan-

guage monitor and Basic 4.0 features are no longer available.

Other relocation options allow flipping the C-64 Link in and out of the system or relocating to an area compatible with the PET emulator program. Most of these options also disable the machine language monitor and the Basic 4.0 commands.

If a program isn't compatible with the C-64 Link cartridge, you can turn off the link after loading the program, assuming the program doesn't use the disk. Otherwise, you'll have to load the relocater program first, relocate the C-64 Link software to an appropriate location for the desired program and then load the program itself.

Having the IEEE type disks on the Commodore-64 is really a pleasure when compared to the VIC-1541 serial interface drives. A 20K program takes about 40 seconds to load from a VIC-1541 drive. The same program takes only ten seconds to load from a 4040 drive with the C-64 Link. Actually, there wasn't any appreciable difference between loading a program on the PET or the Commodore-64 (with the C-64 Link) from the 4040 disk.

Process in Script

Richvale also provides a word processor for the Commodore-64, called Script-64, that includes special support for the C-64 Link cartridge. If the program detects that the C-64 Link cartridge is installed during initialization, it will prompt for the desired peripheral types to be used.

Script-64 is written in assembly language and takes a unique approach to word processing.

Instead of providing a scrolling display while editing and inserting text, this pro-

Address correspondence to Bob Baker, 15 Windsor Drive, Atco, NJ 08004.

gram restricts you to 22-line screens. Each file consists of 40 screens and each disk can hold only 999 files. With this structure, you typically write one paragraph per screen to allow room for future expansion and editing.

Formatting is controlled by one global control map while a special, small control map is associated with each screen for local control. When printing a document, you must specify which screens are to be included and in what order they are to be printed, but you can use ranges of numbers for convenience.

The program is supplied on a disk but it isn't copy protected. However, a protection key supplied with the program must be inserted in the front joystick connector before the program can function.

New Products

Other products from Richvale Telecommunications for the Commodore systems include:

- Scratchpad 64 is a database/mail list program for the Commodore-64. It's fully C-64 Link compatible and suitable for both single and dual disk drives. Scratchpad data can be merged with Script-64 word processor data to produce hundreds of letters from a single document.

Scratchpad-64 formats the disk as a series of screens with each screen allowing 20 lines of up to 30 characters per line. The screens can be stored in alphabetic or numeric order around a single or selected line. You can do a global search on any line, and each line can be used for a different type of data. You can print labels, envelopes, or mailing lists using parallel, serial or IEEE printers.

- Color 80 turns the Commodore-64 into an 80-column computer without the expense of extra cartridges or boards. You can create and run 80-column programs without losing any Basic memory.

- Supercopy is a disk utility for the Commodore 1541 disk drive. The program is menu-driven with frequent on-screen prompts. It includes a complete set of disk maintenance commands and re-

duces the time needed to back up a disk with a single drive to two-to-seven minutes.

- SuperBasic 64 gives you three versions of Commodore Basic version 4, plus a built-in machine language monitor. It provides the standard Basic 4.0 disk, file, data handling and string handling/garbage collection features. It includes Basic 4.1 graphics, which features three graphics modes and extra graphics commands for draw, box, locate, color and scale.

SuperBasic also includes Extended Basic 4.2 that's fully compatible with the new Commodore B series. This includes full error-trapping commands, the ability

**VIC Games is a
bargain. It has to
be the most complete
introduction to a
computer ever published.**

to load and save binary files, function keys to display Basic or user-defined commands, and extra Basic commands like else, print using, dispose, DRun, DClear.

- INTEL Terminal is an intelligent, menu-driven terminal program for the Commodore-64. It operates using RS-232C modems, and separate versions will be available for the entire line of Commodore computers. With this package you can store data to tape or disk and you can upload or download files. There's a 50K buffer for recording data for output to the printer, disk or tape. You'll also find autodialing features, four function keys that are user definable and a real-time clock with an alarm feature.

- Basic Aid is a programmer's development tool for the Commodore Basic language. Separate versions are available for the entire Commodore line. The Commodore-64 version adds 33 additional com-

mands, including special editing, disk and printer commands as well as special help features and conversion functions.

- Planet Quarx is a three-stage video game for the Commodore-64. The object of the game is to reach the planet called Quarx. In stage one, the player must maneuver his spaceship through the asteroid zone, avoiding asteroids as they spin out toward his ship from the center of the screen.

Past the asteroid field, play moves into Stage 2 where the ship meets the outer defense system of Quarx. The display shows the view from the cockpit of the player's ship. Using the joystick, the player aims and fires at approaching alien spaceships or turns on his forcefield to avoid collisions. Once past the outer defenses, play moves to the planet Quarx itself where the player destroys Quarxite tanks.

There is no time or fuel limits—play continues until all five ships have been destroyed. The game provides arcade sound and graphics displays with joystick controls and escalating difficulty.

- Space Gunner is an exciting video arcade-type game for the Commodore-64 with the object being to defend the planet Namcap against the fleet of the Warlords of Zorlon. The screen shows the display from inside the cockpit of an attack ship. The joystick is used to aim the gunsight and fire to destroy the approaching Zorlons. The control panel at the bottom of the screen gives continuous readouts of both fuel and scores. As the player's ship absorbs energy from exploding Zorlon ships, the fuel count rises. The level of difficulty increases and the game progresses.

- V-Link-20 is a cartridge that plugs into the back of the VIC-20, expanding it to the power of a much larger computer. It supports serial, parallel and IEEE peripherals and adds Basic 4.0 commands, a machine language monitor, and a built-in modem program just like the C-64 Link.

- VICscript is a word processor for the

Circle 329 on Reader Service card.

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VIC-20 that is similar in operation and appearance to Script-64 and RTC 4, also from Richvale Telecommunications. Data created with VICscript is compatible with both of these word processors.

● The Draft Aid Computer Aided Design System is a CAD System that is designed for the Commodore 8000 series. Draft Aid goes from hand drawing to plotter quickly and easily, through four user friendly steps:

The Matrix Editor lets you specify where you want the drawing to appear on the plotter's board.

The Segment Editor is then used to draw on the screen shapes that will appear in the final drawing.

The Relation File Editor combines shapes with positions.

The Relation File Plotter then performs the actual plot with one instruction, which leaves the operator free to proceed with other work.

The plotting features allow for creating arcs and circles, rotating drawings through 360 degrees, moving drawings anywhere on the plot surface, enlarging or reducing drawings in either axis, inverting any drawing in either axis and drawing up to 9801 shapes with one instruction.

The data entry features include operational and error alarms, full error checking, an escape function to cancel the last command, full menu-drive for ease of use, a built-in calculator, cross referencing, file sorting and formatted screen displays.

All in all, this is a great package for educational uses, printed circuit boards, design and electronic drafting.

Super VIC-Kit

Mantronics Software Designs offers a Basic programmer's utility pack on disk called the Super VIC-Kit. This package adds more than two dozen new commands to simplify writing and editing Basic programs. It also includes a resident machine language monitor, a complete set of disk commands, an escape key option and automatic keyword generation. The package requires at least 8K of memory plus the VIC-1540/1541 disk drive.

The program is supplied on disk in a special relocating format. When first loaded, it relocates itself to the top of memory. It occupies 3K of memory and doesn't use any zero page locations, making it transparent to most programs.

In addition to 26 new commands, Super VIC-Kit has a repeating key for each key on the board. It also provides you with a space bar pause option for catalog, Dlist, list, and find commands.

The program is a great addition for all Commodore VIC users. You should specify which Super VIC-Kit fits your computer. The Commodore and VIC packages

cost \$24.95. Mantronics Software Designs at 360 Pierce Ave., Suite 120, No. Mankato, MN 56001.

Speed Term II

Gary Schroeder of Astral*Image is offering the latest version of his SpeedTerm II intelligent terminal program for the Commodore-64. SpeedTerm II resides in high RAM (\$C000 to \$CFFF) leaving approximately 38K (\$0801 to \$9DFF) free for the upload/download buffer area. Other terminal packages typically use compiled Basic and only offer a 24K to 28K buffer area.

Another unique feature of SpeedTerm II is the on-line printer dump with its ability to create program files for uploading to CIS or sending to friends with SpeedTerm II. SpeedTerm II will automatically convert downloaded files into a program and then load and run it at the stroke of a key.

The Super VIC-Kit is a great addition for all VIC users.

Besides the upload and download capabilities, you can also select screen colors, view the function key assignments and change terminal options. When using the on-line printer dump, normal XOFF (control-S) and XON (control-Q) flow control is used to ensure that no data is lost.

Several additional utility programs are also included in SpeedTerm II. DiscPrint gives you reviewing and printing options for sequential disk files. Profile converts program files on disk into an .IMG file called Up for uploading SpeedTerm II.

Fileprogram converts downloaded Basic files into program files on disk. The SpeedTerm Editor creates sequential files used for either future uploading with SpeedTerm II or for your purposes.

For more information on the entire package, check the CompuServe xal database of the C-64 SIG and look at a file named "speed.tii 73575,604" or write Astral*Image, 812 B St., Studio A, San Rafael, CA 94901. The complete package sells for \$29.95 and includes disk and documentation for the Commodore-64.

Mator Products

Mator Systems Ltd. of Sussex, England has been designing and building highly technical microprocessor-based products since 1976. It currently has several interesting products for the Commodore PET/CBM systems.

Shark Deep in Capacity

The Mator Shark is an intelligent high-density hard disk storage system with storage capacities of ten, 20, 30, 60 and 120 megabytes. Through its processor and disk operating system, it provides you with a number of software interfaces. Various hardware interfaces, including Intel Multibus, RS-232 and IEEE-488, are also available to accommodate most existing micro systems.

As an option, there's a disk operating system that's completely compatible with the Commodore PET/CBM systems in conjunction with the IEEE-488 interface. This version simply connects to your PET/CBM with standard IEEE cabling and instantly provides unprecedented data-storage capacity and performance. Existing software developed for use with Commodore floppy disks can be used without modification since all features of the latest Commodore PET DOS 2.5 are supported.

Sharkive on Tape

As if that weren't enough, there's also a fast tape archive unit available that directly connects to the Shark hard disk system. The Sharkive is a high-speed tape archiving system designed specifically for use with the Mator Shark hard disk system. It uses ANSI standard 1/4-inch removable magnetic tape cartridges such as the DC-300XL and DC-600A. These cartridges provide 11M or 15M formatted capacity on each cartridge.

Transfer Data in No Time

The Sharkdrive is a separate unit from the Shark hard disk and can be added at any time. It is directly connected to the Shark by ribbon cable and is controlled by the same controller that controls the Shark's hard disk. This avoids the time-consuming transfer of data to and from the host computer when carrying out a back-up or restore function.

A Dolphin Connection

The Mator Dolphin 3 is a compact and extremely cost-effective microprocessor based solution to the problem of connecting micros to mainframe computers. It allows virtually any micro system with a standard IEEE-488 or RS-232C communications interface to successfully communicate with mainframes. It achieves this through specially designed hardware and PROM resident software.

Commodore Converts to Protocol

To date, Mator has successfully installed protocol converters for Commodore systems involving the following protocols:

- IBM Bi-Sync Protocols.
- ICL XBM protocols: PCT2, C02 and C03 batch.

2780, 3780 and HASP batch.
3270 interactive.

- Burroughs poll/select protocol.
- various asynchronous protocols.

Also, many standard and well-proven conversions are now available and new conversions are constantly under development.

For more information on these and other Mator products, contact Mator, Inc., 4203 Spencer St., Torrance, CA 90506.

Misc Happenings

Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827) recently released a new game for the Commodore-64 and VIC-20 called Type Attack.

Developed by a game designer and a professional educator, Type Attack teaches typing skills in a fast-action arcade-style game. Groups of words and letters falling from the top of the playing field must be stopped by typing the same words or letters on the computer keyboard.

The game includes 39 preprogrammed lessons designed to follow standard typing course formats in such a way that the player automatically learns typing conventions and concepts. A lesson creator allows the player to design lessons for specific typing or vocabulary problems.

There's also a real-time words-per-minute bar with settings from one to 99.

The program is supplied on disk for the Commodore-64 and on cartridge for the VIC-20. Suggested price is \$39.95 retail.

Other new programs for the Commodore systems include:

- Gruds in Space and Blade of Blackpoole, both graphics adventure games for the Commodore-64 at \$39.95 each.

- Squish'em, originally on disk for the C-64 is now on cassette for the VIC-20 at \$19.95. It requires a minimum of 8K expansion memory to load on the VIC.

- Final Orbit is a simulated 3D battle in space for the VIC-20 with a free game on the cartridge. The pinball simulation game called Bumper Bash and Final Orbit retail for \$39.95.

Written for Challenge

Hayden Book Company recently announced a new book, *VIC Games* written by Nick Hampshire. The book includes a collection of 36 arcade-style, strategy and educational word games for the VIC-20.

With this book you can challenge your driving skills on your own Grand Prix race track, fight a war with space pirates, maneuver your way through a maze of landmines, solve the Rubik's cube,

create colorful images and music, find your way out of the jungle or improve children's spelling and vocabulary skills. The 192-page softbound book sells for \$12.95.

Commodore Guide

The editors of Consumer Guide offer an introductory guide for the Commodore-64 and VIC-20 by Jim and Ellen Strasma. This 80-page, spiral-bound picture book makes things simple for the first-time computer user. It's completely illustrated with exceptionally clear photographs.

The book shows you how to connect the computer to your television or monitor, introduces you to the many features found on the keyboard, explains the various peripherals and how to expand your system and reviews various software and other resources that are available.

Meet the Keys

A special chapter, "Meet the Keys," ensures that you'll fully understand the exact function of each key on the keyboard. There's also a series of step-by-step screen-illustrated exercises.

This super book is a bargain at \$4.98. It has to be the most complete and understandable introduction to a computer ever published. I highly recommend it. □

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LETTERS TO THE EDITOR

In Search Of . . .

I am writing to express concern over the absence of research in connection with computer usage.

I am attempting to update my files on what is and isn't being done around the country. My immediate goal was to update an article I wrote that appeared in the November/December 1982 issue of *Electronic Learning*. However, various letters I've received, plus articles I've seen in the popular press indicating at least some backlash to the "hype" of computers, have made me feel that there is much more at stake here than my curiosity.

One problem I'm having in gathering information is that people doing research in instructional computing are "loosely coupled." If I want information on cognitive development in children from birth to age two, I know exactly where to start. But people in CAI research are all over the place in terms of departments and institutions as well as geography. Newspapers often print "author's queries" requesting information of some type. I would like to query for research papers on instructional computing. Any assistance would be most appreciative.

Gerald W. Bracey, Ph.D.
Director, Research, Evaluation and
Testing
Commonwealth of Virginia
Department of Education
PO Box 69
Richmond, VA 23216

A Dialogue on Analog

I am writing in reference to the article "Scope It with Your Apple" (p. 76, August 1983). I was surprised to read that the LM3914 is a D/A converter.

I counted five references to the circuit under discussion as a D/A converter. The other two references correctly identify the function as that of an A/D converter. This can be remembered by the function you are performing. The real world that you are measuring is analog—everything varies continuously—while the computers we are using work digitally—on or off.

When you take a real world signal (analog) and feed it into a computer you use an analog-to-digital converter (A/D), and when you want to send an analog signal out of a computer you use a digital to

analog converter (D/A).

Overall, I enjoyed the article. I look forward to each issue of several of your magazines.

Larry G. Nelson
Webster, MA

Commodore Software Wanted Down Under

There is a shortage of programs for the VIC-20 and Commodore-64 in Australia, especially the Commodore 64.

I would be happy to act as an agent for any company that would like to sell its programs in Australia. I would be willing to promote programs to the dealers.

John Presutto
Computers by Post
781 Centre Road
East Bentleigh
Melbourne, VIC 3165 Australia

Know Your Rights

In reference to September's Publisher's Remarks ("Dealer Frustrations," p. 6)—the type of contract referred to is to the best of my knowledge, as a nonlawyer, called an "adhesion contract."

Namely, all rights accrue to the contractor and not to the contractee. I believe that if you conferred with a contracts lawyer, you would find that such a contract is likely to be considered legally and inherently invalid and virtually unenforceable.

The fact that contractors are getting away with this tactic is, in my opinion, indicative of a populace unfamiliar with its rights.

Lawrence G. Teebken
New York, NY

Guarding Against Protection

It has been mentioned many times in your publication that people should try to stay away from buying protected software.

I have about a half-dozen letters out to various companies with just one simple question, "Is your program XXXXX copy protected?" It's kind of obvious that they will not pay 20 cents to tell you not to buy it.

Maybe going to your local computer outlet, if your outlet is good, is one way of finding out whether a program is protected, but what if the dealer makes a mistake? It's a 90 percent chance that he won't buy it back if he erred.

I think the best way to deal with this problem is for reviewers to include a statement about whether the program is copy protected or not.

Marvin A Konopik
San Francisco, CA

I Hate Them Mices t' Pieces

Having recently read many articles describing the care and feeding of mice (mouses or whatever), I decided to go out and see what all the noise was about.

I noticed that several designers in an attempt to increase the utility of the little devils have added additional keys, and some have even developed encoding schemes so that three keys can be used to implement a number of functions.

Due to the prohibitive cost of a commercial unit, I set out to grow one at home. Not being as innovative as these high-paid engineers, I felt that the best way to incorporate more input functions would be to simply add more keys. But how many? Let's see, perhaps ten, no 20, 30, no, no, how about 50? I know, 53 keys. That should be just about enough to enter almost any type of data, and imagine not having to learn how to type!!!

I have developed a prototype of just such a device and found that it can be used to enter just about any kind of data and is compatible with almost all software (with little or no modifications). An initial problem was the unit's tendency to roll around the work surface. I solved this problem by attaching four small rubber feet (Radio Shack P/N 64-2346).

A remaining problem is the difficulty I have encountered in memorizing the function of each key. I think that some form of labeling on each plastic key cap might be in order . . . Let me see, QWER TYUIOP ???

Seriously though, can you flip a mouse over and use it as a trackball? Maybe then you could at least use it to play space invaders.

Clifford I. Knight
Manomet, MA

Z80 Software

SOFTWARE DESCRIPTIONS

TPM (TPM I) - \$80 A Z80 only operating system which is capable of running CP/M programs. Includes many features not found in CP/M such as independent disk directory partitioning for up to 255 user partitions, space, time and version commands, date and time, create FCB, chain program, direct disk I/O, abbreviated commands and more! Available for North Star (either single or double density), TRS-80 Model I (offset 4200H) or II, Versafloppy I, or Tarbell I.

TPM-II - \$125 An expanded version of TPM which is fully CP/M 2.2 compatible but still retains the extra features our customers have come to depend on. This version is super FAST. Extended density capability allows over 600K per side on an 8" disk. Available preconfigured for Versafloppy II (8" or 5"), Epson QX-10, Osborne II or TRS-80 Model II.

CONFIGURATOR I

This package provides all the necessary programs for customizing TPM for a floppy controller which we do not support. We suggest ordering this on single density (8SD).

Includes: TPM-II (\$125), Sample PIOS (BIOS) SOURCE (\$FREE), MACRO II (\$100), LINKER (\$80), DEBUG I (\$80), QED (\$150), ZEDIT (\$50), TOP I (\$80), BASIC I (\$50) and BASIC II (\$100)
\$815 Value NOW \$250

CONFIGURATOR II

Includes: TPM-II (\$125), Sample PIOS (BIOS) SOURCE (\$FREE), MACRO II (\$100), MACRO III (\$150), LINKER (\$80), DEBUG I (\$80), DEBUG II (\$100), QED (\$150), ZTEL (\$80), TOP II (\$100), BUSINESS BASIC (\$200) and MODEM SOURCE (\$40) and DISASSEMBLER (\$80)
\$1485 Value NOW \$400

MODEL I PROGRAMMER

This package is only for the TRS-80 Model I. Note: These are the ONLY CDL programs available for the Model I. It includes: TPM I (\$80), BUSINESS BASIC (\$200), MACRO I (\$80), DEBUG I (\$80), ZDDT (\$40), ZTEL (\$80), TOP I (\$80) and MODEM (\$40)
\$680 Value NOW \$175

MODEL II PROGRAMMER

This package is only for the TRS-80 Model II. It includes: TPM-II (\$125), BUSINESS BASIC (\$200), MACRO II (\$100), MACRO III (\$150), LINKER (\$80), DEBUG I (\$80), DEBUG II (\$100), QED (\$150), ZTEL (\$80), TOP II (\$100), ZDDT (\$40), ZAPPLE SOURCE (\$80), MODEM (\$40), MODEM SOURCE (\$40) and DISASSEMBLER (\$80)
\$1445 Value NOW \$375

BASIC I - \$50, a 12K+ basic interpreter with 7 digit precision

BASIC II - \$100, A 12 digit precision version of Basic I

BUSINESS BASIC - \$200, A full disk extended basic with random or sequential disk file handling and 12 digit precision (even for TRIG functions). Also includes PRIVACY command to protect source code, fixed and variable record lengths, simultaneous access to multiple disk files, global editing, and more!

ACCOUNTING PACKAGE - \$300, Written in Business Basic. Includes General Ledger, Accounts Receivable/Payable, and Payroll. Set up for Hazeltine 1500 terminal. Minor modifications needed for other terminals. Provided in unprotected source form

MACRO I - \$80, A Z80/8080 assembler which uses CDL/TDL mnemonics. Handles MACROs and generates relocatable code. Includes 14 conditionals, 16 listing controls, 54 pseudo-ops, 11 arithmetic/logical ops, local and global symbols, linkable module generation, and more!

MACRO II - \$100, An improved version of Macro I with expanded linking capabilities and more listing options. Also internal code has been greatly improved for faster more reliable operation

MACRO III - \$150, An enhanced version of Macro II. Internal buffers have been increased to achieve a significant improvement in speed of assembly. Additional features include line numbers, cross reference, compressed PRN files, form feeds, page parity, additional pseudo-ops, internal setting of time and date, and expanded assembly-time data entry

DEVELOPER I

Includes: MACRO I (\$80), DEBUG I (\$80), ZEDIT (\$50), TOP I (\$80), BASIC I (\$50) and BASIC II (\$100)
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DEVELOPER II

Includes: MACRO II (\$100), MACRO III (\$150), LINKER (\$80), DEBUG I (\$80), DEBUG II (\$100), BUSINESS BASIC (\$200), QED (\$150), TOP II (\$100), ZDDT (\$40), ZAPPLE SOURCE (\$80), MODEM SOURCE (\$40), ZTEL (\$80), and DISASSEMBLER (\$80).
\$1280 Value NOW \$350

DEVELOPER III

Includes: QAL (\$200), QED (\$150), BUSINESS BASIC (\$200), ZTEL (\$80) and TOP II (\$100)
\$730 Value NOW \$300

COMBO

Includes: DEVELOPER II (\$1280), ACCOUNTING PACKAGE (\$300), QAL (\$200) and 6502X (\$150)
\$1930 Value NOW \$500

LINKER - \$80, A linking loader for handling the linkable modules created by the above assemblers.

DEBUG I - \$80, A tool for debugging Z80 or 8080 code. Disassembles to CDL/TDL mnemonics compatible with above assemblers. Traces code even through ROM. Commands include Calculate Display, Examine, Fill, Goto, List, Mode, Open File, Put, Set Wait, Trace, and Search

DEBUG II - \$100, A superset of Debug I. Adds Instruction Interpreter, Radix change, Set Trap/Conditional display, Trace options, and Zap FCB

6502X - \$150, A 6502 cross assembler. Runs on the Z80 but assembles 6502 instructions into 6502 object code! Similar features as our Macro assemblers

QAL - \$200, A SUPER FAST Z80 assembler. Up to 10 times faster than conventional assemblers. Directly generates code into memory in one pass but also to offset for execution in its own memory space. Pascal like structures repeat until, if then else, while do begin end case of. Multiple statements per line, special register handling expressions, long symbol names, auto and modular assembly, and more! This one uses ZILOG Mnemonics.

QED - \$150, A screen editor which is both FAST and easy to learn. Commands include block delete, copy and move to a named file or within text, repeat previous command, change, locate, find at start of line, and numerous cursor and window movement functions. Works with any CRT having clear screen, addressable cursor, clear to end of line, clear to end of screen, and 80x24.

DISK FORMATS

When ordering software specify which disk format you would like

CODE	DESCRIPTION
8SD	8" IBM 3740 Single Density (128 bytes/26 sectors/77 tracks)
8DD	8" Double Density (256 bytes/26 sectors/77 tracks)
8XD	8" CDL Extended Density (1024 bytes/8 sectors/77 tracks 616K)
SSD	5.25" Single Density (TRS80 Model I, Versafloppy I, Tarbell I)
SEP	5.25" Epson Double Density
5PC	5.25" IBM PC Double Density
5XE	5.25" Xerox 820 Single Density
5OS	5.25" Osborne Single Density
5ZA	5.25" Z80 Apple (Softcard compatible)
TPM INFO	
CODE	DESCRIPTION
TPM I:	
NSSD/H	North Star Single Density for Horizon I/O
NSSD/Z	North Star Single Density for Zapple I/O
NSDD/H	North Star Double Density for Horizon I/O
NSDD/Z	North Star Double Density for Zapple I/O
TRS80-I	TRS-80 Model I (4200H Offset)
TRS80-II	TRS-80 Model II
V18	Versafloppy I 8"
V15	Versafloppy I 5.25"
TPM-II:	
V18	Versafloppy II 8" (XD)
V15	Versafloppy II 5.25"
TRS80-II	TRS-80 Model II (XD)

Prices and Specifications subject to change without notice.

TPM, Z80, CP/M, TRS80 are trademarks of CDL, Zilog, DRI and Tandy respectively

ZTEL - \$80, An extensive text editing language and editor modelled after DEC's TECO

ZEDIT - \$50, A mini text editor. Character/line oriented. Works well with hardcopy terminals and is easy to use. Includes macro command capability

TOP I - \$80, A Text Output Processor for formatting manuals, documents, etc. Interprets commands which are entered into the text by an editor. Commands include justify, page number, heading, subheading, centering, and more

TOP II - \$100, A superset of TOP I. Adds embedded control characters in the file, page at a time printing, selected portion printing, include/merge files, form feed/CRLF option for paging, instant start up, and final page ejection

ZDDT - \$40, This is the disk version of our famous Zapple monitor. It will also load hex and relocatable files.

ZAPPLE SOURCE - \$80, This is the source to the SMB ROM version of our famous Zapple monitor. It can be used to create your own custom version or as an example of the features of our assemblers. Must be assembled using one of our assemblers.

MODEM - A communication program for file transfer between systems or using a system as a terminal. Based on the user group version but modified to work with our SMB board or TRS-80 Models I or II. You must specify which version you want.

MODEM SOURCE - \$40, For making your own custom version. Requires one of our Macro Assemblers.

DISASSEMBLER - \$80, Does bulk disassembly of object files creating source files which can be assembled by one of our assemblers

HARDWARE

S-100 - **SMB II Bare Board** \$50, 'System Monitor Board' for S-100 systems. 2 serial ports, 2 parallel ports, cassette interface, 4K memory (ROM, 2708 EPROM, 2114 RAM), and power on jump. When used with Zapple ROM below, it makes putting a S-100 system together a snap

Zapple ROM \$35, Properly initializes SMB I/II hardware, provides a powerful debug monitor

IBM PC - **Big Blue Z80 board** \$595, Add Z80 capability to your IBM Personal Computer. Runs CP/M programs but does not require CP/M or TPM. Complete with Z80 CPU, 64K add on memory, serial port, parallel port, time and date clock with battery backup, hard disk interface, and software to attach to PC DOS and transfer programs. Mfr'd by QCS

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APPLE II - **Chairman Z80** \$345, Add Z80 capability to your Apple II/II Plus computer. Runs CP/M programs with our more powerful TPM. Includes 64K memory add on (unlike the competition this is also useable by the 6502/DOS as well as the Z80). TPM, QAL assembler, QED Screen Editor, and Business Basic. Mfr'd by AMT Research

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Make a Real Investment In Your Micro

This real estate investment article doesn't promise to make you rich, but it will have you knocking on the right doors. You could be a rich man—you could lose your shirt.

By Richard Gillette

Any list of the world's richest people shows that real estate is a lucrative profession.

The reason is simple: real estate can generate income while deferring and/or reducing income tax. But a word of caution is in order: you can also lose your shirt in real estate. What makes the difference?

Good real estate investments, like most human endeavors, are the result of both skill and effort. Luck can play a part, but in the end, luck isn't the controlling factor.

It Takes Time

One problem investors have encountered is that the financial analysis "effort," even when you have the skill, requires a lot of time. My attempts to evaluate an opportunity previously took many hours with pencil, paper

and calculator, leaving only a few hours to master the skills and leaving some accuracy questions. But that was before the home computer, VisiCalc, and my investment program.

By eliminating the manual rote effort, I find skill improvement per unit time increases at an incredible rate. The program I'll describe here provides the potential real estate investor with the ability to financially evaluate alternatives with armchair ease, developing overnight insights that many professional investors spend a lifetime achieving.

This article will cover the fundamentals of both residential real estate investing (including the income tax implications) and my VisiCalc-based program. The program is presented as a preformatted spreadsheet where specific data is entered at appropriate

points. Calculation over a ten-year span is automatic.

The program fully and uniquely accounts for the effects of income tax. Hence, even if you're an experienced investor, you should cover the fundamental parts of this article to fully appreciate the program.

This investment program will let you analyze real estate ventures with more sophistication than the programs at many large real estate concerns. Various rates of financing, inflation, depreciation and taxing can be programmed, which lets you analyze various scenarios in real time. It be-

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comes easy to financially compare real estate alternatives.

The Rules, Basically

The basic rules of investing, given equal risk, are: 1) more money returned is better than less, 2) the same monies returned earlier are better than later, and 3) the same earnings taxed at lower rates are better than those taxed at higher rates. It sounds simple, and with this program, it is.

Real estate investments generate income over time. The monies you receive from two alternate investments may be the same. However, if they don't occur at the same time, they aren't equal. The one that occurs first is greater than the other. Returns that occur over time must be evaluated on the basis of alternate investment opportunities—that is, compared over time at an interest rate. For example, \$1000 today is equal to \$1100 one year from now when the simple interest rate is ten percent.

Real estate investments also generate various types of returns: ordinary income (or loss), depreciation (an offset to taxable income), capital gains (taxed at a lower rate than ordinary income) and, sometimes, investment tax credits.

All four types have different tax implications; for the same dollars earned, each gives different returns after tax income. This program calculates pretax income equivalents (my nomenclature) for each type of return as a function of your marginal tax rate.

Your marginal tax rate is the decimal fraction paid on the last dollar you earn. Pretax income equivalence lets you compare alternate real estate investment returns against each other

and/or against other investments, such as stocks or bonds. Investment returns are normalized by being calculated in pretax equivalent units.

PIE Ingredients

Pretax income equivalents (PIE) are the wages you must earn at your marginal income tax rate to obtain the same after-tax income as the investment. For example, we all have seen tax-free bonds advertize data at ten percent interest rate, 20 percent effective in the 50 percent tax bracket. The 20 percent return is a "pretax income

The basic rules of
investing sound simple
and with this program
they are.

equivalent" as a function of a 50 percent marginal tax rate.

If your marginal tax rate is 20 percent, the bond pretax equivalent would be 12½ percent—quite a difference from the 20 percent above.

Pretax income equivalents and the acronym PIE will be used interchangeably throughout this article. This concept isn't unique, but it's not commonly used because its application requires extra calculation. However, once programmed, it requires no extra effort.

This complete program allows you to evaluate alternatives, testing various inflation, finance and tax scenarios over a ten-year period. Both the

time value of money and PIE are included. The program, therefore, provides a fast method of choosing the optimum investment that meets your personal investment criteria.

The Example Program Screen

The full spreadsheet screen is shown in Fig. 1; all values are calculated over ten years. The screen is ordered in accordance with the terms defined in the sidebar article. Although a large amount of information has been generated, the numeric inputs required are minimal. Only the data that is underscored has been used as input data!

When the screen is viewed on your CRT terminal, not all of it will be visible. A minimum of three columns will be available on a 40-column display. The program has been formatted to have titles in the first three columns, and the required input data is limited to columns 2 (B) and 3 (C). The parentheses denote the spreadsheet column nomenclature.

When the format is loaded into computer memory, each required data point appears as a blank with a dotted underscore. When you input data, you overwrite the underscore. These two features allow fast and efficient data entry, even if the user has limited terminal skills.

For the six-apartment example shown, 200000 is entered at the top of column 3 (C) as the price and 50000 is entered as the down payment. In column 2 (B), the entry is .13 as the mortgage interest rate, .03 as points, and 30 as years. In column 3 (C), 1000 is entered as the purchasing fees.

All other information in this section was calculated. Only the underscored

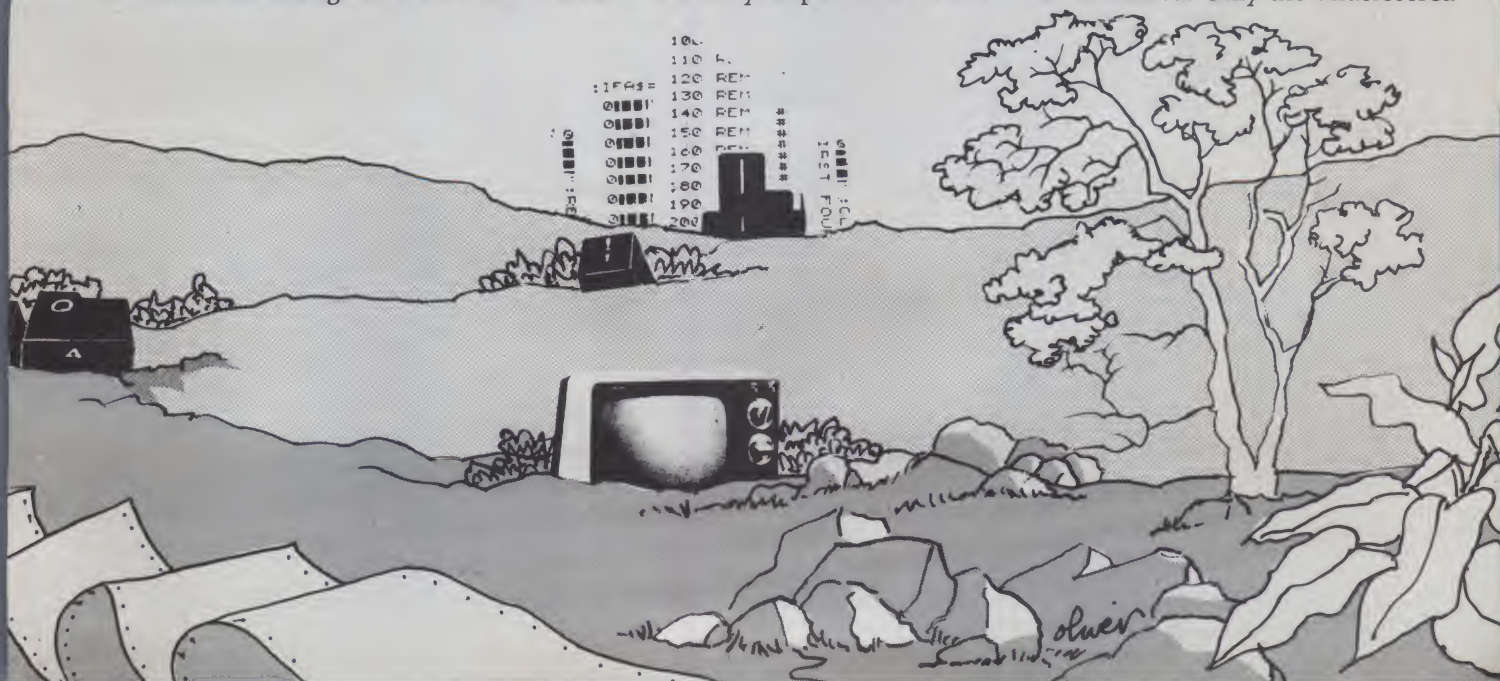


Fig. 1. Screen example.

INVESTMENT	DEC.RATE	DOLLARS	(YEAR 6)	PAYMENT PER MONTH	PER YEAR	
PRICE	NA	<u>200000</u>	REMORTG.	1ST 5 Y	1659	19912
DOWN PAYMT	0.25	<u>50000</u>	DEC.RATE	YR 6 ON	1659	19912
MORTGAGE	<u>0.13</u>	150000	0.13			
POINTS	<u>0.03</u>	4500	0.00			
-S.DEPOSIT	NA	-2100	DOLLARS			
PURCH.FEES	NA	<u>1000</u>	0			
OTHER	YEARS	.....	YEARS			
PERIOD	<u>30</u>	NA	25			
CASH REQUIRED		53400	NA			

INCOME	DEC.INFL	MONTH 1	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
UNIT 1	0.05	325	3900	4095	4300	4515	4740	4977	5226	5488	5762	6050
UNIT 2	0.05	350	4200	4410	4631	4862	5105	5360	5628	5910	6205	6516
UNIT 3	0.05	350	4200	4410	4631	4862	5105	5360	5628	5910	6205	6516
UNIT 4	0.05	350	4200	4410	4631	4862	5105	5360	5628	5910	6205	6516
UNIT 5	0.05	350	4200	4410	4631	4862	5105	5360	5628	5910	6205	6516
UNIT 6	0.05	375	4500	4725	4961	5209	5470	5743	6030	6332	6649	6981
UNIT 7	0.05	.....	0	0	0	0	0	0	0	0	0	0
UNIT 8	0.05	.....	0	0	0	0	0	0	0	0	0	0
WAS. & DRY.	0.03	50	600	618	637	656	675	696	716	738	760	783
VACANCY OR	0.04	NA	-1008	-1058	-1111	-1167	-1225	-1286	-1351	-1418	-1489	-1564
GROSS OPER. INCOME		2150	24792	26020	27308	28661	30081	31571	33136	34778	36503	38313

EXPENSES	DEC.INFL	MONTH 1	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
R.E.TAX	0.07	208	2496	2671	2858	3058	3272	3501	3746	4008	4289	4589
GAS	0.12	100	1200	1344	1505	1686	1888	2115	2369	2653	2971	3328
ELECTRIC	0.12	25	300	336	376	421	472	529	592	663	743	832
WATER	0.04	30	360	374	389	405	421	438	456	474	493	512
SCAVENGER	0.07	30	360	385	412	441	472	505	540	578	619	662
INSURANCE	0.06	38	456	483	512	543	576	610	647	686	727	770
ASSOC.FEES	.....	.....	0	0	0	0	0	0	0	0	0	0
SEWER	.....	.....	0	0	0	0	0	0	0	0	0	0
REPAIR	0.10	50	600	660	726	799	878	966	1063	1169	1286	1415
DECORATING	0.10	50	600	660	726	799	878	966	1063	1169	1286	1415
SNOW PLOW	0.10	17	204	224	247	272	299	329	361	398	437	481
GARDENING	0.10	25	300	330	363	399	439	483	531	585	643	707
ADVERTISE	0.10	3	36	40	44	48	53	58	64	70	77	85
PHONE	0.10	4	48	53	58	64	70	77	85	94	103	113
OFF. & POST	0.10	3	36	40	44	48	53	58	64	70	77	85
MISC.	0.10	10	120	132	145	160	176	193	213	234	257	283
LEGAL ANNL	0.10	17	204	224	247	272	299	329	361	398	437	481
MANAGMT. OR	.....	0	0	0	0	0	0	0	0	0	0	0
INST.S.DEP	0.05	9	105	110	116	122	128	134	141	148	155	163
POINTS	NA							0				
PURCH.FEES	NA							0				
GROSS OPER. EXPENSE		619	7425	8067	8768	9535	10373	11291	12295	13395	14600	15921

MORTGAGE BALANCE		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
	MONTH 1	149966	149524	149021	148449	147798	147057	146214	145254	144162	142919
	MONTH 2	149931	149484	148976	148398	147740	146991	146138	145168	144064	142808
MORTGAGE	MONTH 3	149896	149445	148931	148346	147681	146924	146062	145082	143966	142696
MONTHLY	MONTH 4	149861	149404	148885	148294	147622	146856	145985	144994	143866	142582
PAYMENT	MONTH 5	149825	149364	148839	148241	147562	146788	145908	144906	143765	142468
1ST 5 YEARS	MONTH 6	149789	149322	148792	148188	147501	146719	145829	144816	143664	142352
	MONTH 7	149752	149281	148744	148134	147439	146649	145749	144726	143561	142235
1659	MONTH 8	149715	149239	148696	148080	147377	146578	145669	144634	143457	142116
	MONTH 9	149678	149196	148648	148024	147315	146507	145588	144542	143351	141997
	MONTH 10	149640	149153	148599	147969	147251	146435	145506	144448	143245	141876
	MONTH 11	149602	149110	148550	147912	147187	146362	145423	144354	143138	141753
	MONTH 12	149563	149066	148500	147856	147122	146288	145339	144258	143029	141630

More →

Figure continued.

MORTGAGE PRINCIPAL REPAYED/YEAR	437	497	566	644	733	834	949	1080	1230	1399
CUMULATIVE	437	934	1500	2144	2878	3712	4661	5742	6971	8370
DEPRECIATION LIFE VALUE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
ADJUSTED BASES NA 205500										
LAND VALUE (COST) NA 20000										
ACRS PP 3Y 3 10000	2500	3800	3700							
ACRS PP 5Y 5 15000	2250	3300	3150	3150	3150					
ACRS PP10Y 10	0	0	0	0	0	0	0	0	0	0
ACRS RP15Y 15 159300	19116	15930	14337	12744	11151	9558	9558	9558	9558	7965
MACH.EXP.2500 MAX/EA 1200	90	132	126	252	252					
TOTAL ACRS / YEAR 185500	23956	23162	21313	16146	14553	9558	9558	9558	9558	7965
ACRS CUMULATIVE	23956	47118	68431	84577	99130	108688	118246	127804	137362	145327
DEPRECIATION STRAIGHT LINE										
PP 3Y 3Y 3 10000	1667	3333	3333	1667	0	0	0	0	0	0
PP 5Y 5Y 5 15000	1500	3000	3000	3000	3000	1500	0	0	0	0
PP 10Y 10Y 10 0	0	0	0	0	0	0	0	0	0	0
RP 15Y 15Y 15 159300	5310	10620	10620	10620	10620	10620	10620	10620	10620	10620
MACHNY. 5Y 5 1200	114	228	228	228	228	114				
TOTAL/YEAR 185500	8591	17181	17181	15515	13848	12234	10620	10620	10620	10620
STRAIGHT LINE CUMULATIVE	8591	25772	42953	58468	72316	84550	95170	105790	116410	127030
OPERATING INCOME (PRE TAX)	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
GROSS OPERATING INCOME	24792	26020	27308	28661	30081	31571	33136	34778	36503	38313
LESS GROSS OPERATING EXPENSE	7425	8067	8768	9535	10373	11291	12295	13395	14600	15921
OPERATING PROFIT OR LOSS (-)	17367	17953	18540	19126	19708	20281	20841	21383	21903	22392
CASH FLOW 0.30 DEC.TAX R	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
OPERATING PROFIT OR LOSS (-)	17367	17953	18540	19126	19708	20281	20841	21383	21903	22392
-MORTGAGE INTEREST @ ABOVE RATE	-19475	-19414	-19346	-19267	-19179	-19077	-18962	-18831	-18682	-18512
-ANNUAL DEBT SERVICE PRINCIPAL	-437	-497	-566	-644	-733	-834	-949	-1080	-1230	-1399
CASH FLOW (+) OR (-) (PRETAX)	-2545	-1959	-1371	-785	-204	369	929	1472	1991	2480
ACRS (1) S.L.(0) DEP 1	-23956	-23162	-21313	-16146	-14553	-9558	-9558	-9558	-9558	-7965
ITC (0) YEAR (1) EXP 0	120									
NET CASH FLOW AFTER TAX @ T.R.	5394	5428	5264	4101	4003	2875	3233	3574	3892	3706
INCOME 0.30 TAX RATE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
OPERATING PROFIT OR LOSS (-)	17367	17953	18540	19126	19708	20281	20841	21383	21903	22392
-MORTGAGE INTEREST @ ABOVE RATE	-19475	-19414	-19346	-19267	-19179	-19077	-18962	-18831	-18682	-18512
DEPRECIATION DISCOUNTED BY TAX	10267	9927	9134	6920	6237	4096	4096	4096	4096	3414
INVT CREDIT DISCOUNTED BY TAX	171									
NET PRETAX INCOME EQUIVALENT	8331	8465	8329	6778	6766	5299	5975	6648	7317	7293
APPRECIAT. 0.06 ANNUAL RT	212000	224720	238203	252495	267645	283704	300726	318770	337896	358170
LESS SALES 0.06 COMMISSN.	-12720	-13483	-14292	-15150	-16059	-17022	-18044	-19126	-20274	-21490
APPRECIATED INV. VALUE PRETAX	199280	211237	223911	237346	251586	266682	282682	299643	317622	336679
ADJUSTED INVESTMENT GAIN PRETAX	-11530	-10193	-8139	-5324	-1704	2772	8152	14493	21852	30289
PRETAX APPRECIATION PIE	-11530	-10193	-8139	-5324	-1704	3484	10249	18220	27471	38078
ACC. DEPRECIATION RECOVERY CUM	-15365	-21346	-25478	-26109	-26814	-24138	-23076	-22014	-20952	-18297
PERSONAL PROPERTY DEP.RECOVERY	-2953	-7874	-11482	-12779	-12263	-10456	-7842	-5228	-2614	
INVESTMENT CREDIT RECOVERY CUM	-137	-103	-69	-34						
TOTAL APPREC. CUMULATIVE PIE	-29985	-39516	-45168	-44246	-40781	-31110	-20669	-9022	3905	19781
INVEST.ALT 0.20 ANNUAL RT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
CUMULATIVE INVESTMENT NOT PV	53837	54334	54900	55544	56278	57112	58061	59142	60371	61770
CUMULATIVE ROI PIE NOT PV	-21654	-22720	-20043	-12343	-2111	12859	29274	47570	67814	90983
PV OF INVESTMENT @ YEAR N	53764	54110	54437	54748	55042	55322	55587	55838	56076	56302
PV OF ROI @ YEAR N, PIE	-18045	-14621	-8498	-428	7240	14985	21303	26519	30792	34408
PV OF ROI @ YEAR N, AFTER TAX	-12632	-10234	-5949	-300	5068	10489	14912	18563	21555	24086
PV % ROI @ YEAR N, PIE	-33.56	-27.02	-15.61	-0.78	13.15	27.09	38.32	47.49	54.91	61.11
PV % ROI @ YEAR N, AFTER TAX	-23.49	-18.91	-10.93	-0.55	9.21	18.96	26.83	33.25	38.44	42.78

data had to be entered. The same applies to the remainder of the screen.

In addition to this input data, a number of options are included. Interest rate and financing terms can be changed at the start of year 6 (a five-year balloon sale is refinanced at year 6).

This is accomplished by adding the

quisition are capitalized (not expensed), the change in points required for alternate financing changes the depreciation values—hence the error check.

To calculate the information after you have entered the input data or changed it, issue a recalculation command by typing an exclamation mark.

Three-year personal property:	three, five or 12 years
Five-year personal property:	five, 12 or 25 years
Ten-year personal property:	ten, 25 or 35 years
15-year real property:	15, 35 or 45 years

Table 1. Limitations imposed by new tax law.

new interest rate, point rate, purchasing fees and the period of the new loan at the top of column 4 (D).

Options are included to select ACRS or straight-line depreciation (defaults to ACRS), and to select either income tax credit for machinery or to expense it during the first year (default to expense).

These selections are accomplished in column 3 (C) at the middle of p. 2 (row 101 and 102) by changing the 1 to a 0. With these options, you can examine the tax implications of ACRS or straight-line depreciation, and of investment tax credit or first-year expense, with respect to when you expect to sell the building.

Depreciation years are fully selectable under ACRS and are automatically replicated for straight-line depreciation. The new tax law, however, limits your selection of years to those in Table 1.

The program further limits your machinery depreciation life, selected under straight line, to three or five years. Defaults for depreciation life are the minimums, three, five, 10 and 15 years, except for machinery where five years has been used.

I have included a depreciation-value-checker. If the total of all depreciation components and the land value isn't equal to the adjusted basis, the total ACRS value and straight-line value—in the third (C) column—will show an error.

The total value will be shown only when you input the correct values. I have found that, as I iterated financing alternatives, I would forget to modify the amounts to be depreciated. Remembering that the costs of ac-

The manual recalculation is required as the spreadsheet takes about 30 seconds for each recalculation, much too long to wait while entering data with automatic recalculation. Only one recalculation is required as the program converges. All formulas have been arranged so as to not require data before it's been calculated. This feature called for special attention in formatting.

To iterate optional financing, inflation, tax rate and so on, simply overwrite the old data with the new data and issue a recalculation command. Presto, the new data is calculated!

What You'll Need

Memory used in my Apple II is 64K—30K for VisiCalc and 34K for the

A Look at the Lingo

This article is designed to give a brief review of real estate investment terms.

●Mortgage: Price – down payment.

●Cash required: Down payment + points – security deposit (if applicable) + purchasing fees (legal, title, appraisal and so on, that by law are capitalized) + other (prorations, i.e., items prepaid by the seller that you assume, such as real estate tax, insurance and so on. These are expensed, not capitalized).

●Mortgage payment per month or year: A function of the amount borrowed, interest rate and the period of the loan (an algebraic question that, once programmed, is trivial). Note: Before computers, most people used tables, not algebra.

●Inflation rate: The decimal-rate rents and expenses projected to a compound rate over time. Each may have (and typically does have) its individual rate.

●Gross operating income (pretax): Rents + other (typically, washer and dryer). Note: Rents are reduced if you have vacancies.

●Vacancy rate: The decimal rate of annual rents lost due to vacancies.

●Gross operating expense: All costs of operation. Doesn't include the interest on your loan or the principal repaid.

●Management (fee) rate: The decimal fraction of income paid to manage the building. Note: It's zero if you manage it yourself.

●Mortgage balance: The amount of principal owed at the stated date.

●Repaid per year and cumulative: Principal repaid as stated.

●Adjusted Basis: Price of building + costs associated with its initial acquisition (points, fees and so on) that are capitalized.

●Depreciation straight line: Unaccelerated depreciation. Note: You may choose between ACRS and straight line; however, your choice of years to depreciate is limited to fixed years. ACRS will return money to you faster; however, you should realize that all income tax savings resulting from ACRS are subject to income tax when you sell the building (i.e., all accelerated depreciation recovered is taxed as ordinary income).

All depreciation recovered from personal property is also taxed as ordinary income. Straight-line depreciation recovered from the sale of residential real property isn't subject to depreciation recovery. *It isn't taxed as ordinary income, but it is included in your income during the year of sale as capital gains and taxed at a lower rate.* This feature, conversion of ordinary income into capital gains, is one of the major reasons for real estate investing. Depreciation defers tax and, in the case of residential property, reduces it. Hence, the more you have, the better, and the higher your tax rate, the greater the benefit, assuming that you have taxable income.

Depreciation note: If ITC (see below) is chosen, the amount depreciated is reduced by half of the ITC. If machinery is expensed (see below), it isn't depreciated. Only one ITC

●Depreciation ACRS: A fixed annual percent specified by the Economic Recovery Tax Act of 1981. ACRS replaces all accelerated depreciation (sum-of-digits, double-declining balance and so on) with a standard set of tables. ACRS covers both real and personal property, but the value of the land isn't depreciated.

(continued on p. 42)

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UNLOCKING THE POWER OF COMPUTING

4-1430

program. The full ten-year program requires a 64K system; however, a four-year analysis can be accommodated in a 48K configuration, if rents and expenses are not itemized in full detail. The screen format was designed to allow for this contingency.

After the program was developed, it was also tested on an IBM PC. The listing was transferred via an RS-232 serial link. The program ran without change! The memory requirement is 76K—42K for VisiCalc and 34K for the program. A five-year analysis can be accommodated in a 64K PC.

Again, note that the format was designed to allow for this contingency.

VisiCalc isn't the only base program that can be used. I loaded the program into The Spreadsheet by A.P.P.L.E., and it ran without change. The Spreadsheet uses 34K, so only an

The program explanation
will start from the
bottom of the listing,
which is the beginning
of the program.

eight-year program can be accommodated on a 64K Apple II. This program, however, automatically finds and uses all RAM cards up to 512K, so, with any extra RAM you can run the full ten years.

Either VisiCalc or The Spreadsheet is required and must be loaded into memory before this program is used.

Each data cell is ten columns wide; the titles and ten years of calculations take up 130 columns and 132 rows, respectively, plus one row for scratchpad calculations. The scratchpad was required for convergence. This provides a two-page output on most printers.

I usually print the screen of Fig. 1 on my Epson MX-80 in the 132-column mode. This mode can be entered from VisiCalc by typing a (quote, up-arrow, H, O, F) ("↑HOF) between the printer slot selection and the lower-left selection (-M132). The minus sign suppresses printer linefeed for single-space printing. It is required for only your first printing; the same is true for ("↑HOF) on the Apple II.

The (-) is not required, and the ("↑HOF) is required each time with the IBM PC. Other printers will use their unique set-up code. Printers with capabilities of less than 132 columns

can be used by printing in sections. The first five years can be printed in 80 columns, and the next five years in 50 additional columns.

(from p. 40)

or machinery expense is allowed for a given equipment.

●Machinery expense: The new tax law allows you to fully expense the first \$2500 of machinery each year (\$5000 if a joint return) as an alternate to the investment tax credit.

●ITC investment tax credit: A reduction in your income tax for investing in income-producing machinery. Note: For a small apartment owner, investment credit is ten percent of the cost of, typically, a washer and dryer, lawn mower or snow plow (not the water heater, boiler and so on). Investment credit is six percent if the machinery has a life of less than five years.

●Operating income pretax (operating profit or loss): Gross operating income (pretax) - gross operating expenses (pretax).

●Marginal income tax rate: The decimal tax rate paid on the last dollar earned.

●Cash flow (pretax): Net operation income - debt service payments (payment on loan), interest and principal.

●Net cash flow (after tax): Pretax cash flow discounted by your marginal income tax rate + depreciation discounted by your marginal tax rate + any investment tax credit likewise discounted.

Note: This (post-tax cash flow) should be positive, otherwise you have a poor or unusual investment. Furthermore, for a good investment, the post-tax cash flow should be positive even if your tax rate drops. An investment shouldn't be totally dependent on tax savings; however, tax savings are a major part of real estate investment returns.

●Income (net pretax income equivalent): Gross profit (or loss) - mortgage interest payments + the depreciation discounted by your marginal tax rate + the investment tax credit, which is likewise discounted.

●Appreciation: The increasing value of the building as supply, demand and inflation act on the building. Note: This may be a large part of your investment return.

●Sales commission: The decimal fraction of the sales price paid to the real estate broker to sell the building. Note: It may be zero if you do it yourself, but be sure that doing it yourself doesn't reduce the price you get for the building.

●Appreciated investment value pretax: appreciation - sales commission.

●Adjusted investment gain pretax: Appreciated building value - adjusted basis - cumulative straight-line building depreciation (i.e., the investment growth that is taxable as capital gains).

●Pretax appreciation PIE: Appreciated building value converted to a PIE at the end of each year. This increased value (PIE) reflects the reduced rates for capital gains tax.

●Accelerated depreciation recovery cumula-

About the Program

The complete listing for the program is provided in Listing 1. It's the

line depreciation (both valued at the end of each year).

●Personal property depreciation recovered: Value of personal property when sole - cumulative straight-line depreciation.

Note: Accelerated depreciation recovery (ACRS - straight line) has already been taken into account. All depreciation recovered on the sale of personal property is taxed as ordinary income. Furthermore, no depreciation is allowed for the year of the sale. To simplify calculations, all sales are assumed to be at the end of the year.

●Investment credit recovery cumulative: A set rate (percentage) that recovers the tax savings you received if you didn't keep the machinery the length of time required by law to earn the credit. The original investment credit offsets income tax; hence, the recovery is taxed as ordinary income.

●Total appreciation cumulative PIE: Appreciation discounted by tax - accelerated depreciation recovery - personal property straight-line recovery - investment tax credit recovery.

●Investment alternative annual rate: The interest rate that you want to use to evaluate your investment return over time. Note that as a minimum, it's equal to the highest rate you can receive from alternative investments with equal risk.

●Cumulative investment (not present value): Cash required at the start of the investment + cumulative payments to debt service principal.

●Cumulative return on investment (ROI) PIE (not PV): The summation of net pretax income equivalents over the years evaluated + total appreciation cumulative pretax income equivalents. Note that this ROI doesn't take into account the time value of money (interest or personal investment rate), so it has no comparative value.

●Present value of investment at year n: Cash required at initial investment - expensed prorations (other above) + mortgage principal payments discounted by present value of ROI at year n PIE.

●Present value (PV) of ROI at year n PIE: The investment rate discounted sum of each year's PIE + the investment rate discounted cumulative total appreciation PIE. Note: This value is used when you compare alternative investment, given equal investment rates and risk.

●Present value of ROI at year n after tax: The time discounted return after you pay your income tax. Note: As the income is both PV and PIE, income tax is just the tax rate multiplied by PIE.

●PV percent at year n PIE and post-tax: The respective values evaluated against the cumulative investment at the same year, expressed as a percentage.

Fig. 2. Listing of real estate program.

```

>B11:" YEARS
>A11:"OTHER
>D10:0
>C10:" .....
>B10:0NA
>A10:"PURCH.FEES
>D9:" DOLLARS
>C9:-B133
>B9:0NA
>A9:"-S.DEPOSIT
>D8:/F$0
>C8:(B8*C7)
>B8:/F$ .....
>A8:"POINTS
>M7:/F$
>D7:/F$+B7
>C7:+C5-C6
>B7:/F$ .....
>A7:"MORTGAGE
>G6:12*F6
>F6:+E133
>E6:" YR 6 ON
>D6:" DEC.RATE
>C6:" .....
>B6:/F$+C6/C5
>A6:"DOWN PAYMT
>G5:12*F5
>F5:+A60
>E5:" 1ST 5 Y
>D5:" REMORTG.
>C5:" .....
>B5:0NA
>A5:"PRICE
>M4:/F$
>G4:" PER YEAR
>F4:" PER MONTH
>E4:" PAYMENT
>D4:" (YEAR 6)
>C4:" DOLLARS
>B4:" DEC.RATE
>A4:"INVESTMENT
>F2:"F.
>E2:"YOURTOWN C
>D2:"E
>C2:"F.GILLETT
>B2:"(C) 1983 R
>A2:"COPYRIGHT
>G1:"01/02/83
>F1:"T.
>E1:"111 MAIN S
>D1:"S PIE
>C1:"NT ANALYSIS
>B1:"E INVESTME
>A1:"REAL ESTAT
/W1
/GOC
/GRM
/GFI/GC10
/X!/X>A1:>A1:

*****
*
* COPYRIGHT *
*
* (C) 1983 *
*
* RICHARD F *
*
* GILLETTE *
*
*****

>E20:(1+B20)*D20
>D20:12*C20
>C20:" .....
>B20:/F$+B16
>A20:"UNIT 5
>M19:(1+B19)*L19
>L19:(1+B19)*K19
>K19:(1+B19)*J19
>J19:(1+B19)*I19
>I19:(1+B19)*H19
>H19:(1+B19)*G19
>G19:(1+B19)*F19
>F19:(1+B19)*E19
>E19:(1+B19)*D19
>D19:12*C19
>C19:" .....
>B19:/F$+B16
>A19:"UNIT 4
>M18:(1+B18)*L18
>L18:(1+B18)*K18
>K18:(1+B18)*J18
>J18:(1+B18)*I18
>I18:(1+B18)*H18
>H18:(1+B18)*G18
>G18:(1+B18)*F18
>F18:(1+B18)*E18
>E18:(1+B18)*D18
>D18:12*C18
>C18:" .....
>B18:/F$+B16
>A18:"UNIT 3
>M17:(1+B17)*L17
>L17:(1+B17)*K17
>K17:(1+B17)*J17
>J17:(1+B17)*I17
>I17:(1+B17)*H17
>H17:(1+B17)*G17
>G17:(1+B17)*F17
>F17:(1+B17)*E17
>E17:(1+B17)*D17
>D17:12*C17
>C17:" .....
>B17:/F$+B16
>A17:"UNIT 2
>M16:(1+B16)*L16
>L16:(1+B16)*K16
>K16:(1+B16)*J16
>J16:(1+B16)*I16
>I16:(1+B16)*H16
>H16:(1+B16)*G16
>G16:(1+B16)*F16
>F16:(1+B16)*E16
>E16:(1+B16)*D16
>D16:12*C16
>C16:" .....
>B16:/F$ .....
>A16:"UNIT 1
>M15:" YEAR 10
>L15:" YEAR 9
>K15:" YEAR 8
>J15:" YEAR 7
>I15:" YEAR 6
>H15:" YEAR 5
>G15:" YEAR 4
>F15:" YEAR 3
>E15:" YEAR 2
>D15:" YEAR 1
>C15:" MONTH 1
>B15:" DEC.INFL
>A15:"INCOME
>D13:0NA
>C13:+C6+C8+C9+C10+C11
>B13:"RED
>A13:"CASH REQUIR
>D12:+B12-5
>C12:0NA
>B12:" .....
>A12:"PERIOD
>D11:" YEARS
>C11:" .....

>G26:0SUM(G16...G25)
>F26:0SUM(F16...F25)
>E26:0SUM(E16...E25)
>D26:0SUM(D16...D25)
>C26:0SUM(C16...C24)
>B26:" INCOME
>A26:"GROSS OPERAT.
>M25:-B25*0SUM(M16...M23)
>L25:-B25*0SUM(L16...L23)
>K25:-B25*0SUM(K16...K23)
>J25:-B25*0SUM(J16...J23)
>I25:-B25*0SUM(I16...I23)
>H25:-B25*0SUM(H16...H23)
>G25:-B25*0SUM(G16...G23)
>F25:-B25*0SUM(F16...F23)
>E25:-B25*0SUM(E16...E23)
>D25:-B25*0SUM(D16...D23)
>C25:0NA
>B25:/F$ .....
>A25:"VACANCY 0R
>M24:(1+B24)*L24
>L24:(1+B24)*K24
>K24:(1+B24)*J24
>J24:(1+B24)*I24
>I24:(1+B24)*H24
>H24:(1+B24)*G24
>G24:(1+B24)*F24
>F24:(1+B24)*E24
>E24:(1+B24)*D24
>D24:12*C24
>C24:" .....
>B24:/F$ .....
>A24:"WAS.& DRY.
>M23:(1+B23)*L23
>L23:(1+B23)*K23
>K23:(1+B23)*J23
>J23:(1+B23)*I23
>I23:(1+B23)*H23
>H23:(1+B23)*G23
>G23:(1+B23)*F23
>F23:(1+B23)*E23
>E23:(1+B23)*D23
>D23:12*C23
>C23:" .....
>B23:/F$+B16
>A23:"UNIT 8
>M22:(1+B22)*L22
>L22:(1+B22)*K22
>K22:(1+B22)*J22
>J22:(1+B22)*I22
>I22:(1+B22)*H22
>H22:(1+B22)*G22
>G22:(1+B22)*F22
>F22:(1+B22)*E22
>E22:(1+B22)*D22
>D22:12*C22
>C22:" .....
>B22:/F$+B16
>A22:"UNIT 7
>M21:(1+B21)*L21
>L21:(1+B21)*K21
>K21:(1+B21)*J21
>J21:(1+B21)*I21
>I21:(1+B21)*H21
>H21:(1+B21)*G21
>G21:(1+B21)*F21
>F21:(1+B21)*E21
>E21:(1+B21)*D21
>D21:12*C21
>C21:" .....
>B21:/F$+B16
>A21:"UNIT 6
>M20:(1+B20)*L20
>L20:(1+B20)*K20
>K20:(1+B20)*J20
>J20:(1+B20)*I20
>I20:(1+B20)*H20
>H20:(1+B20)*G20
>G20:(1+B20)*F20
>F20:(1+B20)*E20

>I33:(1+B33)*H33
>H33:(1+B33)*G33
>G33:(1+B33)*F33
>F33:(1+B33)*E33
>E33:(1+B33)*D33
>D33:12*C33
>C33:" .....
>B33:/F$ .....
>A33:"SCAVENGER
>M32:(1+B32)*L32
>L32:(1+B32)*K32
>K32:(1+B32)*J32
>J32:(1+B32)*I32
>I32:(1+B32)*H32
>H32:(1+B32)*G32
>G32:(1+B32)*F32
>F32:(1+B32)*E32
>E32:(1+B32)*D32
>D32:12*C32
>C32:" .....
>B32:/F$ .....
>A32:"WATER
>M31:(1+B31)*L31
>L31:(1+B31)*K31
>K31:(1+B31)*J31
>J31:(1+B31)*I31
>I31:(1+B31)*H31
>H31:(1+B31)*G31
>G31:(1+B31)*F31
>F31:(1+B31)*E31
>E31:(1+B31)*D31
>D31:12*C31
>C31:" .....
>B31:/F$ .....
>A31:"ELECTRIC
>M30:(1+B30)*L30
>L30:(1+B30)*K30
>K30:(1+B30)*J30
>J30:(1+B30)*I30
>I30:(1+B30)*H30
>H30:(1+B30)*G30
>G30:(1+B30)*F30
>F30:(1+B30)*E30
>E30:(1+B30)*D30
>D30:12*C30
>C30:" .....
>B30:/F$ .....
>A30:"GAS
>M29:(1+B29)*L29
>L29:(1+B29)*K29
>K29:(1+B29)*J29
>J29:(1+B29)*I29
>I29:(1+B29)*H29
>H29:(1+B29)*G29
>G29:(1+B29)*F29
>F29:(1+B29)*E29
>E29:(1+B29)*D29
>D29:12*C29
>C29:" .....
>B29:/F$ .....
>A29:"R.E.TAX
>M28:" YEAR 10
>L28:" YEAR 9
>K28:" YEAR 8
>J28:" YEAR 7
>I28:" YEAR 6
>H28:" YEAR 5
>G28:" YEAR 4
>F28:" YEAR 3
>E28:" YEAR 2
>D28:" YEAR 1
>C28:" MONTH 1
>B28:" DEC.INFL
>A28:"EXPENSES
>M26:0SUM(M16...M25)
>L26:0SUM(L16...L25)
>K26:0SUM(K16...K25)
>J26:0SUM(J16...J25)
>I26:0SUM(I16...I25)
>H26:0SUM(H16...H25)

```

More


```

>K39: (1+B39)*J39
>J39: (1+B39)*I39
>I39: (1+B39)*H39
>H39: (1+B39)*G39
>G39: (1+B39)*F39
>F39: (1+B39)*E39
>E39: (1+B39)*D39
>D39: 12*C39
>C39: " .....
>B39: /F$ " .....
>A39: "SNOW FLOW
>M38: (1+B38)*L38
>L38: (1+B38)*K38
>K38: (1+B38)*J38
>J38: (1+B38)*I38
>I38: (1+B38)*H38
>H38: (1+B38)*G38
>G38: (1+B38)*F38
>F38: (1+B38)*E38
>E38: (1+B38)*D38
>D38: 12*C38
>C38: " .....
>B38: /F$ " .....
>A38: "DECORATING
>M37: (1+B37)*L37
>L37: (1+B37)*K37
>K37: (1+B37)*J37
>J37: (1+B37)*I37
>I37: (1+B37)*H37
>H37: (1+B37)*G37
>G37: (1+B37)*F37
>F37: (1+B37)*E37
>E37: (1+B37)*D37
>D37: 12*C37
>C37: " .....
>B37: /F$ " .....
>A37: "REPAIR
>M36: (1+B36)*L36
>L36: (1+B36)*K36
>K36: (1+B36)*J36
>J36: (1+B36)*I36
>I36: (1+B36)*H36
>H36: (1+B36)*G36
>G36: (1+B36)*F36
>F36: (1+B36)*E36
>E36: (1+B36)*D36
>D36: 12*C36
>C36: " .....
>B36: /F$ " .....
>A36: "SEWER
>M35: (1+B35)*L35
>L35: (1+B35)*K35
>K35: (1+B35)*J35
>J35: (1+B35)*I35
>I35: (1+B35)*H35
>H35: (1+B35)*G35
>G35: (1+B35)*F35
>F35: (1+B35)*E35
>E35: (1+B35)*D35
>D35: 12*C35
>C35: " .....
>B35: /F$ " .....
>A35: "ASSOC. FEES
>M34: (1+B34)*L34
>L34: (1+B34)*K34
>K34: (1+B34)*J34
>J34: (1+B34)*I34
>I34: (1+B34)*H34
>H34: (1+B34)*G34
>G34: (1+B34)*F34
>F34: (1+B34)*E34
>E34: (1+B34)*D34
>D34: 12*C34
>C34: " .....
>B34: /F$ " .....
>A34: "INSURANCE
>M33: (1+B33)*L33
>L33: (1+B33)*K33
>K33: (1+B33)*J33
>J33: (1+B33)*I33
>M45: (1+B45)*L45
>L45: (1+B45)*K45
>K45: (1+B45)*J45
>J45: (1+B45)*I45
>I45: (1+B45)*H45
>H45: (1+B45)*G45
>G45: (1+B45)*F45
>F45: (1+B45)*E45
>E45: (1+B45)*D45
>D45: 12*C45
>C45: " .....
>B45: /F$ " .....
>A45: "LEGAL ANNL
>M44: (1+B44)*L44
>L44: (1+B44)*K44
>K44: (1+B44)*J44
>J44: (1+B44)*I44
>I44: (1+B44)*H44
>H44: (1+B44)*G44
>G44: (1+B44)*F44
>F44: (1+B44)*E44
>E44: (1+B44)*D44
>D44: 12*C44
>C44: " .....
>B44: /F$ " .....
>A44: "MISC.
>M43: (1+B43)*L43
>L43: (1+B43)*K43
>K43: (1+B43)*J43
>J43: (1+B43)*I43
>I43: (1+B43)*H43
>H43: (1+B43)*G43
>G43: (1+B43)*F43
>F43: (1+B43)*E43
>E43: (1+B43)*D43
>D43: 12*C43
>C43: " .....
>B43: /F$ " .....
>A43: "OFF. & POST
>M42: (1+B42)*L42
>L42: (1+B42)*K42
>K42: (1+B42)*J42
>J42: (1+B42)*I42
>I42: (1+B42)*H42
>H42: (1+B42)*G42
>G42: (1+B42)*F42
>F42: (1+B42)*E42
>E42: (1+B42)*D42
>D42: 12*C42
>C42: " .....
>B42: /F$ " .....
>A42: "PHONE
>M41: (1+B41)*L41
>L41: (1+B41)*K41
>K41: (1+B41)*J41
>J41: (1+B41)*I41
>I41: (1+B41)*H41
>H41: (1+B41)*G41
>G41: (1+B41)*F41
>F41: (1+B41)*E41
>E41: (1+B41)*D41
>D41: 12*C41
>C41: " .....
>B41: /F$ " .....
>A41: "ADVERTISE
>M40: (1+B40)*L40
>L40: (1+B40)*K40
>K40: (1+B40)*J40
>J40: (1+B40)*I40
>I40: (1+B40)*H40
>H40: (1+B40)*G40
>G40: (1+B40)*F40
>F40: (1+B40)*E40
>E40: (1+B40)*D40
>D40: 12*C40
>C40: " .....
>B40: /F$ " .....
>A40: "GARDENING
>M39: (1+B39)*L39
>L39: (1+B39)*K39
>M54: +M53-E133+(M53*D7/12)
>L54: +L53-E133+(L53*D7/12)
>K54: +K53-E133+(K53*D7/12)
>J54: +J53-E133+(J53*D7/12)
>I54: +I53-E133+(I53*D7/12)
>H54: +H53-A60+(H53*B7/12)
>G54: +G53-A60+(G53*B7/12)
>F54: +F53-A60+(F53*B7/12)
>E54: +E53-A60+(E53*B7/12)
>D54: +D53-A60+(D53*B7/12)
>C54: "MONTH 2
>M53: +L64-E133+(L64*B7/12)
>L53: +K64-E133+(K64*B7/12)
>K53: +J64-E133+(J64*B7/12)
>J53: +I64-E133+(I64*B7/12)
>I53: +H64-E133+(H64*B7/12)
>H53: +G64-A60+(G64*B7/12)
>G53: +F64-A60+(F64*B7/12)
>F53: +E64-A60+(E64*B7/12)
>E53: +D64-A60+(D64*B7/12)
>D53: +C7-A60+(C7*B7/12)
>C53: "MONTH 1
>M52: " YEAR 10
>L52: " YEAR 9
>K52: " YEAR 8
>J52: " YEAR 7
>I52: " YEAR 6
>H52: " YEAR 5
>G52: " YEAR 4
>F52: " YEAR 3
>E52: " YEAR 2
>D52: " YEAR 1
>B52: "ALANCE
>A52: "MORTGAGE B
>D51: /FG"
>M50: @SUM(M29...M49)
>L50: @SUM(L29...L49)
>K50: @SUM(K29...K49)
>J50: @SUM(J29...J49)
>I50: @SUM(I29...I49)
>H50: @SUM(H29...H49)
>G50: @SUM(G29...G49)
>F50: @SUM(F29...F49)
>E50: @SUM(E29...E49)
>D50: @SUM(D29...D49)
>C50: @SUM(C29...C49)
>B50: "T. EXPENSE
>A50: "GROSS OPER
>I49: +D10
>B49: @NA
>A49: "PURCH. FEES
>I48: @IF (D8>0, D8*F64, 0)
>B48: @NA
>A48: "POINTS
>M47: +B47*@SUM(M16...M23)/12
>L47: +B47*@SUM(L16...L23)/12
>K47: +B47*@SUM(K16...K23)/12
>J47: +B47*@SUM(J16...J23)/12
>I47: +B47*@SUM(I16...I23)/12
>H47: +B47*@SUM(H16...H23)/12
>G47: +B47*@SUM(G16...G23)/12
>F47: +B47*@SUM(F16...F23)/12
>E47: +B47*@SUM(E16...E23)/12
>D47: 12*C47
>C47: +B47*(C26-C24)/12
>B47: /F$ " .....
>A47: "INST. S. DEP
>M46: +B46*M26
>L46: +B46*L26
>K46: +B46*K26
>J46: +B46*J26
>I46: +B46*I26
>H46: +B46*H26
>G46: +B46*G26
>F46: +B46*F26
>E46: +B46*E26
>D46: +B46*D26
>C46: +D46/12
>B46: /F$ " .....
>A46: "MANAGMT. @R

```

More


```

>H61: +H60-A60+ (H60*B7/12)
>G61: +G60-A60+ (G60*B7/12)
>F61: +F60-A60+ (F60*B7/12)
>E61: +E60-A60+ (E60*B7/12)
>D61: +D60-A60+ (D60*B7/12)
>C61: "MONTH 9
>M60: +M59-E133+ (M59*D7/12)
>L60: +L59-E133+ (L59*D7/12)
>K60: +K59-E133+ (K59*D7/12)
>J60: +J59-E133+ (J59*D7/12)
>I60: +I59-E133+ (I59*D7/12)
>H60: +H59-A60+ (H59*B7/12)
>G60: +G59-A60+ (G59*B7/12)
>F60: +F59-A60+ (F59*B7/12)
>E60: +E59-A60+ (E59*B7/12)
>D60: +D59-A60+ (D59*B7/12)
>C60: "MONTH 8
>A60: (1+(B7/12))^(B12*12)*B7/1
2*(C5-C6)/(((1+(B7/12))^(B12*1
2))-1)
>M59: +M58-E133+ (M58*D7/12)
>L59: +L58-E133+ (L58*D7/12)
>K59: +K58-E133+ (K58*D7/12)
>J59: +J58-E133+ (J58*D7/12)
>I59: +I58-E133+ (I58*D7/12)
>H59: +H58-A60+ (H58*B7/12)
>G59: +G58-A60+ (G58*B7/12)
>F59: +F58-A60+ (F58*B7/12)
>E59: +E58-A60+ (E58*B7/12)
>D59: +D58-A60+ (D58*B7/12)
>C59: "MONTH 7
>M58: +M57-E133+ (M57*D7/12)
>L58: +L57-E133+ (L57*D7/12)
>K58: +K57-E133+ (K57*D7/12)
>J58: +J57-E133+ (J57*D7/12)
>I58: +I57-E133+ (I57*D7/12)
>H58: +H57-A60+ (H57*B7/12)
>G58: +G57-A60+ (G57*B7/12)
>F58: +F57-A60+ (F57*B7/12)
>E58: +E57-A60+ (E57*B7/12)
>D58: +D57-A60+ (D57*B7/12)
>C58: "MONTH 6
>B58: "S
>A58: "1ST 5 YEAR
>M57: +M56-E133+ (M56*D7/12)
>L57: +L56-E133+ (L56*D7/12)
>K57: +K56-E133+ (K56*D7/12)
>J57: +J56-E133+ (J56*D7/12)
>I57: +I56-E133+ (I56*D7/12)
>H57: +H56-A60+ (H56*B7/12)
>G57: +G56-A60+ (G56*B7/12)
>F57: +F56-A60+ (F56*B7/12)
>E57: +E56-A60+ (E56*B7/12)
>D57: +D56-A60+ (D56*B7/12)
>C57: "MONTH 5
>A57: "PAYMENT
>M56: +M55-E133+ (M55*D7/12)
>L56: +L55-E133+ (L55*D7/12)
>K56: +K55-E133+ (K55*D7/12)
>J56: +J55-E133+ (J55*D7/12)
>I56: +I55-E133+ (I55*D7/12)
>H56: +H55-A60+ (H55*B7/12)
>G56: +G55-A60+ (G55*B7/12)
>F56: +F55-A60+ (F55*B7/12)
>E56: +E55-A60+ (E55*B7/12)
>D56: +D55-A60+ (D55*B7/12)
>C56: "MONTH 4
>A56: "MONTHLY
>M55: +M54-E133+ (M54*D7/12)
>L55: +L54-E133+ (L54*D7/12)
>K55: +K54-E133+ (K54*D7/12)
>J55: +J54-E133+ (J54*D7/12)
>I55: +I54-E133+ (I54*D7/12)
>H55: +H54-A60+ (H54*B7/12)
>G55: +G54-A60+ (G54*B7/12)
>F55: +F54-A60+ (F54*B7/12)
>E55: +E54-A60+ (E54*B7/12)
>D55: +D54-A60+ (D54*B7/12)
>C55: "MONTH 3
>A55: "MORTAGE

```

```

>I72: " YEAR 6
>H72: " YEAR 5
>G72: " YEAR 4
>F72: " YEAR 3
>E72: " YEAR 2
>D72: " YEAR 1
>C72: " VALUE
>B72: "ON LIFE
>A72: "DEPRECIATI
>M70: +M69+L70
>L70: +L69+K70
>K70: +K69+J70
>J70: +J69+I70
>I70: +I69+H70
>H70: +H69+G70
>G70: +G69+F70
>F70: +F69+E70
>E70: +E69+D70
>D70: +D69
>C70: "UMULATIVE
>B70: " C
>M69: +L64-M64
>L69: +K64-L64
>K69: +J64-K64
>J69: +I64-J64
>I69: +H64-I64
>H69: +G64-H64
>G69: +F64-G64
>F69: +E64-F64
>E69: +D64-E64
>D69: +C7-D64
>C69: "PAID/YEAR
>B69: "INCIPAL RE
>A69: "MORTAGE PR
>H67: "ILLETTE
>G67: "83 R. F. G
>F67: "GHT (C) 19
>E67: " 2, COPYRI
>D67: " PIE PAGE
>C67: "T ANALYSIS
>B67: "E INVESTMEN
>A67: "REAL ESTAT
>M64: +M63-E133+ (M63*D7/12)
>L64: +L63-E133+ (L63*D7/12)
>K64: +K63-E133+ (K63*D7/12)
>J64: +J63-E133+ (J63*D7/12)
>I64: +I63-E133+ (I63*D7/12)
>H64: +H63-A60+ (H63*B7/12)
>G64: +G63-A60+ (G63*B7/12)
>F64: +F63-A60+ (F63*B7/12)
>E64: +E63-A60+ (E63*B7/12)
>D64: +D63-A60+ (D63*B7/12)
>C64: "MONTH 12
>M63: +M62-E133+ (M62*D7/12)
>L63: +L62-E133+ (L62*D7/12)
>K63: +K62-E133+ (K62*D7/12)
>J63: +J62-E133+ (J62*D7/12)
>I63: +I62-E133+ (I62*D7/12)
>H63: +H62-A60+ (H62*B7/12)
>G63: +G62-A60+ (G62*B7/12)
>F63: +F62-A60+ (F62*B7/12)
>E63: +E62-A60+ (E62*B7/12)
>D63: +D62-A60+ (D62*B7/12)
>C63: "MONTH 11
>M62: +M61-E133+ (M61*D7/12)
>L62: +L61-E133+ (L61*D7/12)
>K62: +K61-E133+ (K61*D7/12)
>J62: +J61-E133+ (J61*D7/12)
>I62: +I61-E133+ (I61*D7/12)
>H62: +H61-A60+ (H61*B7/12)
>G62: +G61-A60+ (G61*B7/12)
>F62: +F61-A60+ (F61*B7/12)
>E62: +E61-A60+ (E61*B7/12)
>D62: +D61-A60+ (D61*B7/12)
>C62: "MONTH 10
>M61: +M60-E133+ (M60*D7/12)
>L61: +L60-E133+ (L60*D7/12)
>K61: +K60-E133+ (K60*D7/12)
>J61: +J60-E133+ (J60*D7/12)
>I61: +I60-E133+ (I60*D7/12)

```

```

>B81: "ATIVE
>A81: "ACRS CUMUL
>M80: @SUM(M75...M79)
>L80: @SUM(L75...L79)
>K80: @SUM(K75...K79)
>J80: @SUM(J75...J79)
>I80: @SUM(I75...I79)
>H80: @SUM(H75...H79)
>G80: @SUM(G75...G79)
>F80: @SUM(F75...F79)
>E80: @SUM(E75...E79)
>D80: @SUM(D75...D79)
>C80: @IF (@SUM(C75...C79)=(C73-
C74), (C73-C74), 1/0)
>B80: " / YEAR
>A80: "TOTAL ACRS
>H79: @IF (C102=1,0,.21*C79)
>G79: @IF (C102=1,0,.21*C79)
>F79: @IF (C102=1,0,@IF (B87=5,.2
1*(C79-C102/2),.37*(C79-C102/2
)))
>E79: @IF (C102=1,0,@IF (B87=5,.2
2*(C79-C102/2),.38*(C79-C102/2
)))
>D79: @IF (C102=1,C79,@IF (B87=5,
.15*(C79-C102/2),.25*(C79-C102
/2)))
>C79: " .....
>B79: "500 MAX/EA
>A79: "MACH.EXP.2
>M78: .05*C78
>L78: .06*C78
>K78: .06*C78
>J78: .06*C78
>I78: .06*C78
>H78: .07*C78
>G78: .08*C78
>F78: .09*C78
>E78: .1*C78
>D78: .12*C78
>C78: " .....
>B78: 15
>A78: "ACRS RP15Y
>M77: .09*C77
>L77: .09*C77
>K77: .09*C77
>J77: .09*C77
>I77: .1*C77
>H77: .1*C77
>G77: .1*C77
>F77: .12*C77
>E77: .14*C77
>D77: .08*C77
>C77: " .....
>B77: 10
>A77: "ACRS PP10Y
>H76: .21*C76
>G76: .21*C76
>F76: .21*C76
>E76: .22*C76
>D76: .15*C76
>C76: " .....
>B76: 5
>A76: "ACRS PP 5Y
>F75: .37*C75
>E75: .38*C75
>D75: .25*C75
>C75: " .....
>B75: 3
>A75: "ACRS PP 3Y
>C74: " .....
>B74: " (COST) NA
>A74: "LAND VALUE
>C73: +C5+C8+C10
>B73: "ASES NA
>A73: "ADJUSTED B
>M72: " YEAR 10
>L72: " YEAR 9
>K72: " YEAR 8
>J72: " YEAR 7

```



```

>C86:=+C78
>B86:=+B78
>A86:"RP 15Y 3NY
>M85:=+L85
>L85:=+K85
>K85:=+J85
>J85:=+I85
>I85:=+H85
>H85:=+G85
>G85:=+F85
>F85:=+E85
>E85:=2*D85
>D85:=+C85/(B85*2)
>C85:=+C77
>B85:=+B77
>A85:"PP 10Y 3NY
>M84:=IF (SUM(D84...L84)+1>C84
,0,IF (SUM(D84...L84)+D84+1>C
84,D84,C84/B84))
>L84:=IF (SUM(D84...K84)+1>C84
,0,IF (SUM(D84...K84)+D84+1>C
84,D84,C84/B84))
>K84:=IF (SUM(D84...J84)+1>C84
,0,IF (SUM(D84...J84)+D84+1>C
84,D84,C84/B84))
>J84:=IF (SUM(D84...I84)+1>C84
,0,IF (SUM(D84...I84)+D84+1>C
84,D84,C84/B84))
>I84:=IF (SUM(D84...H84)+1>C84
,0,IF (SUM(D84...H84)+D84+1>C
84,D84,C84/B84))
>H84:=+G84
>G84:=+F84
>F84:=+E84
>E84:=2*D84
>D84:=+C84/(B84*2)
>C84:=+C76
>B84:=+B76
>A84:"PP 5Y 3NY
>M83:=IF (SUM(D83...L83)+1>C83
,IF (SUM(D83...L83)+1>C83,0,IF
(SUM(D83...L83)+D83+1>C83,D8
3,C83/B83))
>L83:=IF (SUM(D83...K83)+1>C83
,0,IF (SUM(D83...K83)+D83+1>C
83,D83,C83/B83))
>K83:=IF (SUM(D83...J83)+1>C83
,0,IF (SUM(D83...J83)+D83+1>C
83,D83,C83/B83))
>J83:=IF (SUM(D83...I83)+1>C83
,0,IF (SUM(D83...I83)+D83+1>C
83,D83,C83/B83))
>I83:=IF (SUM(D83...H83)+1>C83
,0,IF (SUM(D83...H83)+D83+1>C
83,D83,C83/B83))
>H83:=IF (SUM(D83...G83)+1>C83
,0,IF (SUM(D83...G83)+D83+1>C
83,D83,C83/B83))
>G83:=IF (SUM(D83...F83)+1>C83
,0,IF (SUM(D83...F83)+D83+1>C
83,D83,C83/B83))
>F83:=+E83
>E83:=2*D83
>D83:=+C83/(B83*2)
>C83:=+C75
>B83:=+B75
>A83:"PP 3Y 3NY
>C82:"T LINE
>B82:"ON STRAIGHT
>A82:"DEPRECIATI
>M81:=+L81+M80
>L81:=+K81+L80
>K81:=+J81+K80
>J81:=+I81+J80
>I81:=+H81+I80
>H81:=+G81+H80
>G81:=+F81+G80
>F81:=+E81+F80
>E81:=+D81+E80
>D81:=+D80
>I93:=+I50
>H93:=+H50
>G93:=+G50
>F93:=+F50
>E93:=+E50
>D93:=+D50
>C93:" EXPENSE
>B93:" OPERATING
>A93:"LESS GROSS
>M92:=+M26
>L92:=+L26
>K92:=+K26
>J92:=+J26
>I92:=+I26
>H92:=+H26
>G92:=+G26
>F92:=+F26
>E92:=+E26
>D92:=+D26
>C92:"ME
>B92:"ATING INCO
>A92:"GROSS OPER
>M91:" YEAR 10
>L91:" YEAR 9
>K91:" YEAR 8
>J91:" YEAR 7
>I91:" YEAR 6
>H91:" YEAR 5
>G91:" YEAR 4
>F91:" YEAR 3
>E91:" YEAR 2
>D91:" YEAR 1
>C91:"E TAX)
>B91:"INCOME (PR
>A91:"OPERATING
>M89:=+L89+M88
>L89:=+K89+L88
>K89:=+J89+K88
>J89:=+I89+J88
>I89:=+H89+I88
>H89:=+G89+H88
>G89:=+F89+G88
>F89:=+E89+F88
>E89:=+D89+E88
>D89:=+D88
>C89:"TIVE
>B89:"INE CUMULA
>A89:"STRAIGHT L
>M88:=SUM(M83...M87)
>L88:=SUM(L83...L87)
>K88:=SUM(K83...K87)
>J88:=SUM(J83...J87)
>I88:=SUM(I83...I87)
>H88:=SUM(H83...H87)
>G88:=SUM(G83...G87)
>F88:=SUM(F83...F87)
>E88:=SUM(E83...E87)
>D88:=SUM(D83...D87)
>C88:=+C80
>A88:"TOTAL/YEAR
>I87:=IF (B87=3,0,D87)
>H87:=IF (B87=3,0,G87)
>G87:=IF (B87=3,D87,F87)
>F87:=+E87
>E87:=2*D87
>D87:=IF (C102=0,(C87-(C133/2))
/(B87*2),(C87/(B87*2)))
>C87:=+C79
>B87:=5
>A87:"MACHNY.3NY.
>M86:=+L86
>L86:=+K86
>K86:=+J86
>J86:=+I86
>I86:=+H86
>H86:=+G86
>G86:=+F86
>F86:=+E86
>E86:=2*D86
>D86:=+C86/(B86*2)
>K100:=+K97+K98+K99
>J100:=+J97+J98+J99
>I100:=+I97+I98+I99
>H100:=+H97+H98+H99
>G100:=+G97+G98+G99
>F100:=+F97+F98+F99
>E100:=+E97+E98+E99
>D100:=+D97+D98+D99
>C100:" (PRETAX)
>B100:" (+) OR (-)
>A100:"CASH FLOW
>M99:=-M69
>L99:=-L69
>K99:=-K69
>J99:=-J69
>I99:=-I69
>H99:=-H69
>G99:=-G69
>F99:=-F69
>E99:=-E69
>D99:=-D69
>C99:" PRINCIPAL
>B99:"BT SERVICE
>A99:"-ANNUAL DE
>M98:=-G6+M69
>L98:=-G6+L69
>K98:=-G6+K69
>J98:=-G6+J69
>I98:=-G6+I69
>H98:=-G5+H69
>G98:=-G5+G69
>F98:=-12*A60+F69
>E98:=-12*A60+E69
>D98:=-12*A60+D69
>C98:"ABOVE RATE
>B98:"NTEREST @
>A98:"-MORTAGE I
>M97:=+M94
>L97:=+L94
>K97:=+K94
>J97:=+J94
>I97:=+I94
>H97:=+H94
>G97:=+G94
>F97:=+F94
>E97:=+E94
>D97:=+D94
>C97:"LOSS (-)
>B97:"PROFIT OR
>A97:"OPERATING
>M96:" YEAR 10
>L96:" YEAR 9
>K96:" YEAR 8
>J96:" YEAR 7
>I96:" YEAR 6
>H96:" YEAR 5
>G96:" YEAR 4
>F96:" YEAR 3
>E96:" YEAR 2
>D96:" YEAR 1
>C96:" DEC.TAX R
>B96:"F#* .....
>A96:"CASH FLOW
>M94:=+M92-M93
>L94:=+L92-L93
>K94:=+K92-K93
>J94:=+J92-J93
>I94:=+I92-I93
>H94:=+H92-H93
>G94:=+G92-G93
>F94:=+F92-F93
>E94:=+E92-E93
>D94:=+D92-D93
>C94:"LOSS (-)
>B94:"PROFIT OR
>A94:"OPERATING
>M93:=+M50
>L93:=+L50
>K93:=+K50
>J93:=+J50

```




```

>D107:+D98
>C107:"ABOVE RATE
>B107:"INTEREST @
>A107:"-MORTGAGE I
>M106:+M94
>L106:+L94
>K106:+K94
>J106:+J94
>I106:+I94
>H106:+H94
>G106:+G94
>F106:+F94
>E106:+E94
>D106:+D94
>C106:"LOSS (-)
>B106:"PROFIT OR
>A106:"OPERATING
>M105:" YEAR 10
>L105:" YEAR 9
>K105:" YEAR 8
>J105:" YEAR 7
>I105:" YEAR 6
>H105:" YEAR 5
>G105:" YEAR 4
>F105:" YEAR 3
>E105:" YEAR 2
>D105:" YEAR 1
>C105:" TAX RATE
>B105:/F*+B96
>A105:"INCOME
>M103:+M97+M98-(M97+M98+M101)
>B96)+M99
>L103:+L97+L98-(L97+L98+L101)
>B96)+L99
>K103:+K97+K98-(K97+K98+K101)
>B96)+K99
>J103:+J97+J98-(J97+J98+J101)
>B96)+J99
>I103:+I97+I98-(I97+I98+I101)
>B96)+I99
>H103:+H97+H98-(H97+H98+H101)
>B96)+H99
>G103:+G97+G98-(G97+G98+G101)
>B96)+G99
>F103:+F97+F98-(F97+F98+F101)
>B96)+F99
>E103:+E97+E98-(E97+E98+E101)
>B96)+E99
>D103:+D97+D98-(D97+D98+D101+
>@IF(C102=1,D102,0))*B96)+D99+@
>IF(C102=1,0,D102)
>C103:"TAX @ T.R.
>B103:"LOW AFTER
>A103:"NET CASH F
>D102:+C133
>C102:0
>B102:"AR (1) EXP
>A102:"ITC (0) YE
>M101:@IF(C101=1,-M80,-M88)
>L101:@IF(C101=1,-L80,-L88)
>K101:@IF(C101=1,-K80,-K88)
>J101:@IF(C101=1,-J80,-J88)
>I101:@IF(C101=1,-I80,@IF(D102
=1,-(I88-I87),-I88))
>H101:@IF(C101=1,-H80,@IF(D102
=1,-(H88-H87),-H88))
>G101:@IF(C101=1,-G80,@IF(D102
=1,-(G88-G87),-G88))
>F101:@IF(C101=1,-F80,@IF(D102
=1,-(F88-F87),-F88))
>E101:@IF(C101=1,-E80,@IF(D102
=1,-(E88-E87),-E88))
>D101:@IF(C101=1,@IF(C102=0,-D
80,-(D80-D79)),@IF(D102=1,-(D8
8-D87),-D88))
>C101:1
>B101:".L.(0) DEP
>A101:"ACRS (1) S
>M100:+M97+M98+M99
>L100:+L97+L98+L99
>M114:+M112+M113
>L114:+L112+L113
>K114:+K112+K113
>J114:+J112+J113
>I114:+I112+I113
>H114:+H112+H113
>G114:+G112+G113
>F114:+F112+F113
>E114:+E112+E113
>D114:+D112+D113
>C114:"UE PRETAX
>B114:"D INV. VAL
>A114:"APPRECIATE
>M113:-B113*M112
>L113:-B113*L112
>K113:-B113*K112
>J113:-B113*J112
>I113:-B113*I112
>H113:-B113*H112
>G113:-B113*G112
>F113:-B113*F112
>E113:-B113*E112
>D113:-B113*D112
>C113:" COMMISSN.
>B113:/F* .....
>A113:"LESS SALES
>M112:(1+B112)*L112
>L112:(1+B112)*K112
>K112:(1+B112)*J112
>J112:(1+B112)*I112
>I112:(1+B112)*H112
>H112:(1+B112)*G112
>G112:(1+B112)*F112
>F112:(1+B112)*E112
>E112:(1+B112)*D112
>D112:(1+B112)*C5
>C112:" ANNUAL RT.
>B112:/F* .....
>A112:"APPRECIAT.
>M110:+M106+M107+M108
>L110:+L106+L107+L108
>K110:+K106+K107+K108
>J110:+J106+J107+J108
>I110:+I106+I107+I108
>H110:+H106+H107+H108
>G110:+G106+G107+G108
>F110:+F106+F107+F108
>E110:+E106+E107+E108
>D110:+D106+D107+D108+D109
>C110:"UIVALENT
>B110:" INCOME EQ
>A110:"NET PRETAX
>D109:@IF(C102=0,D102/(1-B105)
,0)
>C109:"TED BY TAX
>B109:"IT DISCOUNT
>A109:"INVST CRED
>M108:-B105*M101/(1-B105)
>L108:-B105*L101/(1-B105)
>K108:-B105*K101/(1-B105)
>J108:-B105*J101/(1-B105)
>I108:-B105*I101/(1-B105)
>H108:-B105*H101/(1-B105)
>G108:-B105*G101/(1-B105)
>F108:-B105*F101/(1-B105)
>E108:-B105*E101/(1-B105)
>D108:-B105*@IF(C102=1,(D101+D
102),D101)/(1-B105)
>C108:"TED BY TAX
>B108:"ON DISCOUN
>A108:"DEPRECIATIO
>M107:+M98
>L107:+L98
>K107:+K98
>J107:+J98
>I107:+I98
>H107:+H98
>G107:+G98
>F107:+F98
>E107:+E98
.2*(-K89+@SUM(D86...K86))
>J118:.3*(-J89+@SUM(D86...J86)
)
>I118:.4*(-I89+@SUM(D86...I86)
)
>H118:.5*(-H89+@SUM(D86...H86)
)
>G118:.6*(-G89+@SUM(D86...G86)
)
>F118:.7*(-F89+@SUM(D86...F86)
)
>E118:.8*(-E89+@SUM(D86...E86)
)
>D118:.9*(-D89+@SUM(D86...D86)
)
>C118:"P.RECOVERY
>B118:"ROPERTY DE
>A118:"PERSONAL P
>M117:@IF(C101=0,0,M89-M81)
>L117:@IF(C101=0,0,L89-L81)
>K117:@IF(C101=0,0,K89-K81)
>J117:@IF(C101=0,0,J89-J81)
>I117:@IF(C101=0,0,I89-I81)
>H117:@IF(C101=0,0,H89-H81)
>G117:@IF(C101=0,0,G89-G81)
>F117:@IF(C101=0,0,F89-F81)
>E117:@IF(C101=0,0,E89-E81)
>D117:@IF(C101=0,@IF(C102=0,0,
D102-D87),D89-D81)
>C117:"COVERY CUM
>B117:"CIATION RE
>A117:"ACC. DEPRE
>N116:/FI"
>M116:@IF(M115>0,+M115*(1-(.4*
B105))/(1-B105),M115)
>L116:@IF(L115>0,+L115*(1-(.4*
B105))/(1-B105),L115)
>K116:@IF(K115>0,+K115*(1-(.4*
B105))/(1-B105),K115)
>J116:@IF(J115>0,+J115*(1-(.4*
@IF(J115>0,+J115*(1-(.4*B105))
)/(1-B105),J115)
>I116:@IF(I115>0,+I115*(1-(.4*
B105))/(1-B105),I115)
>H116:@IF(H115>0,+H115*(1-(.4*
B105))/(1-B105),H115)
>G116:@IF(G115>0,+G115*(1-(.4*
B105))/(1-B105),G115)
>F116:@IF(F115>0,+F115*(1-(.4*
B105))/(1-B105),F115)
>E116:@IF(E115>0,+E115*(1-(.4*
B105))/(1-B105),E115)
>D116:@IF(D115>0,+D115*(1-(.4*
B105))/(1-B105),D115)
>C116:"PIE
>B116:"RECIATION
>A116:"PRETAX APP
>M115:+M114-C73-@SUM(D86...M86)
)
>L115:+L114-C73-@SUM(D86...L86)
)
>K115:+K114-C73-@SUM(D86...K86)
)
>J115:+J114-C73-@SUM(D86...J86)
)
>I115:+I114-C73-@SUM(D86...I86)
)
>H115:+H114-C73-@SUM(D86...H86)
)
>G115:+G114-C73-@SUM(D86...G86)
)
>F115:+F114-C73-@SUM(D86...F86)
)
>E115:+E114-C73-@SUM(D86...E86)
)
>D115:+D114-C73-@SUM(D86...D86)
)
>C115:"AIN PRETAX
>B115:"NVESTMENT G
>A115:"ADJUSTED I

```


same for the Apple II and the IBM PC with VisiCalc or The Spreadsheet. The program is copyrighted; however, purchasers of this magazine have my permission to use it (not to sell or give it away) providing my credit remains on the program and its printout. If you wish to avoid the typing, see the offer at the end of this article.

The listing from a VisiCalc or The Spreadsheet program comes out backward. The end lists first and the beginning last. It is listed by saving it to the printer. With the Apple II and VisiCalc, you list by typing "slash, S, S, comma, S, N" (/SS,SN), where N is the printer slot number.

The program specification, with the equations omitted, is presented as the glossary. This specification (the glossary) follows the flow of both the screen and the listing.

This listing provides full details on how the data is interrelated, including the equations. The user can just enter this listing into computer memory and then go right ahead with the financial analysis. For safety, save it periodically during your entry and back it up (two copies).

After you have loaded the program and before you enter or calculate the data, many of the cells will show an

Figure continued.

```
+C13-C11+@NPV(B122,D69...J69)
>I125:+C13-C11+@NPV(B122,D69...
.I69)
>H125:+C13-C11+@NPV(B122,D69...
.H69)
>G125:+C13-C11+@NPV(B122,D69...
.G69)
>F125:+C13-C11+@NPV(B122,D69...
.F69)
>E125:+C13-C11+@NPV(B122,D69...
.E69)
>D125:+C13-C11+@NPV(B122,D69...
.D69)
>C125:"EAR N
>B125:"STMENT @ Y
>A125:"PV OF INVE
>M124:@SUM(D110...M110)+M120
>L124:@SUM(D110...L110)+L120
>K124:@SUM(D110...K110)+K120
>J124:@SUM(D110...J110)+J120
>I124:@SUM(D110...I110)+I120
>H124:@SUM(D110...H110)+H120
>G124:@SUM(D110...G110)+G120
>F124:@SUM(D110...F110)+F120
>E124:@SUM(D110...E110)+E120
>D124:@SUM(D110...D110)+D120
>C124:"OT PV
>B124:" ROI PIE N
>A124:"CUMULATIVE
>M123:+C13-C11+M70
>L123:+C13-C11+L70
>K123:+C13-C11+K70
>J123:+C13-C11+J70
>I123:+C13-C11+I70
>H123:+C13-C11+H70
>G123:+C13-C11+G70
>F123:+C13-C11+F70
>E123:+C13-C11+E70
>D123:+C13-C11+D70
>C123:"T NOT PV
>B123:" INVESTMENT
>A123:"CUMULATIVE
>M122:" YEAR 10
>L122:" YEAR 9
>K122:" YEAR 8
>J122:" YEAR 7
>I122:" YEAR 6
>H122:" YEAR 5
>G122:" YEAR 4
>F122:" YEAR 3
>E122:" YEAR 2
>D122:" YEAR 1
>C122:" ANNUAL RT.
>B122:"F$" .....
>A122:" INVEST. ALT.
>M120:@SUM(M116...M119)
>L120:@SUM(L116...L119)
>K120:@SUM(K116...K119)
>J120:@SUM(J116...J119)
>I120:@SUM(I116...I119)
>H120:@SUM(H116...H119)
>G120:@SUM(G116...G119)
>F120:@SUM(F116...F119)
>E120:@SUM(E116...E119)
>D120:@SUM(D116...D119)
>C120:"TIVE PIE
>B120:"EC. CUMULA
>A120:"TOTAL APPR
>G119:.2*-D109
>F119:.4*-D109
>E119:@IF(B87=3,-.33*D109,-.6*
D109)
>D119:@IF(B87=3,-.66*D109,-.8*
D109)
>C119:"COVERY CUM
>B119:" CREDIT RE
>A119:" INVESTMENT
>L118:.1*(-L89+@SUM(D86...L86)
)
>K118:.2*(-K89+@SUM(D86...K86)
)
>J125:+C13-C11+@NPV(B122,D69...
E>B134:"TE
>A134:"R.F.GILLET
>E133:(1+(D7/12))^(D12*12)*D7/
12*D133/((1+(B7/12))^(D12*12)
)-1)
>D133:(1-((1+(B7/12))^(D12*12
)))/(B7/12)*A60
>C133:@IF(C102=1,-C79,@IF(B87>
=5,.1*C79,.06*C79))
>B133:@SUM(C16...C23)
>A133:"(C) 1983
>M130:/F$+M127/M125*100
>L130:/F$+L127/L125*100
>K130:/F$+K127/K125*100
>J130:/F$+J127/J125*100
>I130:/F$+I127/I125*100
>H130:/F$+H127/H125*100
>G130:/F$+G127/G125*100
>F130:/F$+F127/F125*100
>E130:/F$+E127/E125*100
>D130:/F$+D127/D125*100
>C130:"AFTER TAX
>B130:"@ YEAR N,
>A130:"PV % ROI
>M129:/F$+M126/M125*100
>L129:/F$+L126/L125*100
>K129:/F$+K126/K125*100
>J129:/F$+J126/J125*100
>I129:/F$+I126/I125*100
>H129:/F$+H126/H125*100
>G129:/F$+G126/G125*100
>F129:/F$+F126/F125*100
>E129:/F$+E126/E125*100
>D129:/F$+D126/D125*100
>C129:"PIE
>B129:"@ YEAR N,
>A129:"PV % ROI
>M127:(1-B105)*M126
>L127:(1-B105)*L126
>K127:(1-B105)*K126
>J127:(1-B105)*J126
>I127:(1-B105)*I126
>H127:(1-B105)*H126
>G127:(1-B105)*G126
>F127:(1-B105)*F126
>E127:(1-B105)*E126
>D127:(1-B105)*D126
>C127:"AFTER TAX
>B127:"@ YEAR N,
>A127:"PV OF ROI
>M126:@NPV(B122,D110...M110)+(
M120/((1+B122)^10))
>L126:@NPV(B122,D110...L110)+(
L120/((1+B122)^9))
>K126:@NPV(B122,D110...K110)+(
K120/((1+B122)^8))
>J126:@NPV(B122,D110...J110)+(
J120/((1+B122)^7))
>I126:@NPV(B122,D110...I110)+(
I120/((1+B122)^6))
>H126:@NPV(B122,D110...H110)+(
H120/((1+B122)^5))
>G126:@NPV(B122,D110...G110)+(
G120/((1+B122)^4))
>F126:@NPV(B122,D110...F110)+(
F120/((1+B122)^3))
>E126:@NPV(B122,D110...E110)+(
E120/((1+B122)^2))
>D126:@NPV(B122,D110...D110)+(
D120/((1+B122)^1))
>C126:"PIE
>B126:"@ YEAR N,
>A126:"PV OF ROI
>M125:+C13-C11+@NPV(B122,D69...
.M69)
>L125:+C13-C11+@NPV(B122,D69...
.L69)
>K125:+C13-C11+@NPV(B122,D69...
.K69)
>J125:+C13-C11+@NPV(B122,D69...
```

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error. This is caused by dividing by zero, because without data, many of the cells have 0 as their value. Before data entry or calculation, this is normal. However, if it continues past data entry and calculation, a data-entry or program problem exists.

The program explanation will start from the bottom of the listing, which is actually the beginning of the program! Each line of the listing covers a global command (/G) or an individual cell's instruction.

Cell commands take the form of a Goto cell (>A1:), followed by the instructions (label or value/function). Labels are preceded by a quote ("). You don't type the (>A1:) / (") when you are entering the program. They are automatic according to where you place the cursor and your type of input.

Wrapping It Up

The power of this program can be seen by reviewing Fig. 1 and comparing it to Fig. 3 and 4. All data is con-

stant between these figures, except that the tax rate in Fig. 3 has been changed from .3 to .5, and in Fig. 4 the mortgage interest rate is nine percent for the first five years and then 16 percent. The data changes made in Fig. 3 and Fig. 4 are highlighted by an underscore at the affected cells.

The results of these changes in input data have significant effects on the information generated. The higher tax rate (.5) of Fig. 3 results in a much improved cash flow and return on investment. But look at Fig. 4; the after-tax percentage return on investment is almost as good, even though the tax rate returned to .3. This is different from what most investors would have estimated. What's more important, the data is more accurate than can be manually calculated. What happens if alternate depreciation is selected? Or if alternate inflation is selected? Only five minutes extra are required for the answer!

As can be seen, your microcom-

puter can give you most of the skill necessary to start your fortune in real estate investing. ■

To Avoid Program Listing

If you would like to avoid typing the listing into your computer, send me \$30 and indicate the type of computer you own. I will send you a disk with the program listing.

The disk will provide alternate program sizes to allow for less memory than the full ten-year program. In addition, you will receive, via a future mailing, a list of comments and ideas suggested by *Microcomputing* readers and edited by the author. The price includes postage. (Illinois residents should add six percent sales tax.) You will have to procure VisiCalc or The Spreadsheet from your software dealer or A.P.P.L.E.

Marketing Investment Real Estate, Finance Taxation Techniques, by Stephen D. Messner et al, Realtors National Marketing Institute, Chicago, IL.

Federal Tax Course, Students Edition, 1983 (updated annually), Prentice-Hall, Englewood Cliffs, NJ.

CASH FLOW	<u>0.50</u> DEC. TAX R	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
OPERATING PROFIT OR LOSS (-)		17367	17953	18540	19126	19708	20281	20841	21383	21903	22392
-MORTGAGE INTEREST @ ABOVE RATE		-19475	-19414	-19346	-19267	-19179	-19077	-18962	-18831	-18682	-18512
-ANNUAL DEBT SERVICE PRINCIPAL		-437	-497	-566	-644	-733	-834	-949	-1080	-1230	-1399
CASH FLOW (+) OR (-) (PRETAX)		-2545	-1959	-1371	-785	-204	369	929	1472	1991	2480
ACRS (1) S.L. (0) DEP	1	-23956	-23162	-21313	-16146	-14553	-9558	-9558	-9558	-9558	-7965
ITC (0) YEAR (1) EXP	0	120									
NET CASH FLOW AFTER TAX @ T.R.		10607	10353	9688	7358	6808	4546	4769	4975	5160	4523
INCOME	<u>0.50</u> TAX RATE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
OPERATING PROFIT OR LOSS (-)		17367	17953	18540	19126	19708	20281	20841	21383	21903	22392
-MORTGAGE INTEREST @ ABOVE RATE		-19475	-19414	-19346	-19267	-19179	-19077	-18962	-18831	-18682	-18512
DEPRECIATION DISCOUNTED BY TAX		23956	23162	21313	16146	14553	9558	9558	9558	9558	7965
INVEST CREDIT DISCOUNTED BY TAX		240									
NET PRETAX INCOME EQUIVALENT		22088	21701	20508	16005	15082	10761	11437	12110	12778	11844
APPRECIAT.	<u>0.06</u> ANNUAL RT	212000	224720	238203	252495	267645	283704	300726	318770	337896	358170
LESS SALES	<u>0.06</u> COMMISSN.	-12720	-13483	-14292	-15150	-16059	-17022	-18044	-19126	-20274	-21490
APPRECIATED INV. VALUE PRETAX		199280	211237	223911	237346	251586	266682	282682	299643	317622	336679
ADJUSTED INVESTMENT GAIN PRETAX		-11530	-10193	-8139	-5324	-1704	2772	8152	14493	21852	30289
PRETAX APPRECIATION PIE		-11530	-10193	-8139	-5324	-1704	4435	13044	23190	34963	48463
ACC. DEPRECIATION RECOVERY CUM		-15365	-21346	-25478	-26109	-26814	-24138	-23076	-22014	-20952	-18297
PERSONAL PROPERTY DEP. RECOVERY		-2953	-7874	-11482	-12779	-12263	-10456	-7842	-5228	-2614	
INVESTMENT CREDIT RECOVERY CUM		-192	-144	-96	-48						
TOTAL APPREC. CUMULATIVE PIE		-30040	-39557	-45195	-44260	-40781	-30159	-17874	-4052	11397	30166
INVEST. ALT	<u>0.20</u> ANNUAL RT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
CUMULATIVE INVESTMENT NOT PV		53837	54334	54900	55544	56278	57112	58061	59142	60371	61770
CUMULATIVE ROI PIE NOT PV		-7952	4232	19102	36041	54603	75985	99707	125639	153867	184480
PV OF INVESTMENT @ YEAR N		53764	54110	54437	54748	55042	55322	55587	55838	56076	56302
PV OF ROI @ YEAR N, PIE		-6626	6007	19190	31718	42735	52628	60932	67794	73422	77998
PV OF ROI @ YEAR N, AFTER TAX		-3313	3003	9595	15859	21368	26314	30466	33897	36711	38999
PV % ROI @ YEAR N, PIE		-12.32	11.10	35.25	57.94	77.64	95.13	109.62	121.41	130.93	138.53
PV % ROI @ YEAR N, AFTER TAX		-6.16	5.55	17.63	28.97	38.82	47.57	54.81	60.71	65.47	69.27

Fig. 3. Example screen with modified income tax rate.

INVESTMENT PRICE	DEC.RATE NA	DOLLARS 200000	(YEAR 6) REMORTG.	PAYMENT PER MONTH 1ST 5 Y	PER YEAR 1207	14483							
DOWN PAYMT	0.25	50000	DEC.RATE	YR 6 ON	1954	23452							
MORTGAGE	0.09	150000	0.16										
POINTS	0.00	0	0.03										
-S.DEPOSIT	NA	-2100	DOLLARS										
PURCH.FEES	NA	1000	1000										
OTHER	YEARS	.....	YEARS										
PERIOD	30	NA	25										
CASH REQUIRED		48900	NA										
DEPRECIATION ADJUSTED BASES	LIFE NA	VALUE 201000	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	
LAND VALUE (COST)	NA	20000											
ACRS PP 3Y	3	10000	2500	3800	3700								
ACRS PP 5Y	5	15000	2250	3300	3150	3150	3150						
ACRS PP 10Y	10	.....	0	0	0	0	0	0	0	0	0	0	0
ACRS RP 15Y	15	154800	18576	15480	13932	12384	10836	9288	9288	9288	9288	7740	
MACH.EXP. 2500 MAX/EA		1200	90	132	126	252	252						
TOTAL ACRS / YEAR		181000	23416	22712	20908	15786	14238	9288	9288	9288	9288	7740	
ACRS CUMULATIVE			23416	46128	67036	82822	97060	106348	115636	124924	134212	141952	
DEPRECIATION STRAIGHT LINE													
PP 3Y 0NY	3	10000	1667	3333	3333	1667	0	0	0	0	0	0	0
PP 5Y 0NY	5	15000	1500	3000	3000	3000	3000	1500	0	0	0	0	0
PP 10Y 0NY	10	0	0	0	0	0	0	0	0	0	0	0	0
RP 15Y 0NY	15	154800	5160	10320	10320	10320	10320	10320	10320	10320	10320	10320	10320
MACHNY. 0NY	5	1200	114	228	228	228	228	114					
TOTAL/YEAR		181000	8441	16881	16881	15215	13548	11934	10320	10320	10320	10320	
STRAIGHT LINE CUMULATIVE			8441	25322	42203	57418	70966	82900	93220	103540	113860	124180	
CASH FLOW	0.30 DEC.TAX R		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	
OPERATING PROFIT OR LOSS (-)			17367	17953	18540	19126	19708	14882	20841	21383	21903	22392	
-MORTGAGE INTEREST @ ABOVE RATE			-13458	-13362	-13257	-13142	-13016	-22007	-21768	-21489	-21164	-20785	
-ANNUAL DEBT SERVICE PRINCIPAL			-1025	-1121	-1226	-1341	-1467	-1445	-1685	-1964	-2289	-2667	
CASH FLOW (+) OR (-) (PRETAX)			2884	3470	4057	4643	5224	-8571	-2611	-2069	-1550	-1060	
ACRS (1) S.L.(0) DEP	1		-23416	-22712	-20908	-15786	-14238	-9288	-9288	-9288	-9288	-7740	
ITC (0) YEAR (1) EXP	0		120										
NET CASH FLOW AFTER TAX @ T.R.			8856	8906	8744	7584	7488	-3647	453	749	1015	779	
INCOME	0.30 TAX RATE		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	
OPERATING PROFIT OR LOSS (-)			17367	17953	18540	19126	19708	14882	20841	21383	21903	22392	
-MORTGAGE INTEREST @ ABOVE RATE			-13458	-13362	-13257	-13142	-13016	-22007	-21768	-21489	-21164	-20785	
DEPRECIATION DISCOUNTED BY TAX			10035	9734	8961	6765	6102	3981	3981	3981	3981	3317	
INVEST CREDIT DISCOUNTED BY TAX			171										
NET PRETAX INCOME EQUIVALENT			14115	14324	14244	12750	12793	-3145	3054	3875	4719	4924	
APPRECIAT.	0.06 ANNUAL RT		212000	224720	238203	252495	267645	283704	300726	318770	337896	358170	
LESS SALES	0.06 COMMISSN.		-12720	-13483	-14292	-15150	-16059	-17022	-18044	-19126	-20274	-21490	
APPRECIATED INV. VALUE PRETAX			199280	211237	223911	237346	251586	266682	282682	299643	317622	336679	
ADJUSTED INVESTMENT GAIN PRETAX			-6880	-5243	-2889	226	4146	8922	14602	21243	28902	37639	
PRETAX APPRECIATION PIE			-6880	-5243	-2889	284	5213	11216	18357	26706	36334	47318	
ACC. DEPRECIATION RECOVERY CUM			-14975	-20806	-24833	-25404	-26094	-23448	-22416	-21384	-20352	-17772	
PERSONAL PROPERTY DEP.RECOVERY			-2953	-7874	-11482	-12779	-12263	-10456	-7842	-5228	-2614		
INVESTMENT CREDIT RECOVERY CUM			-137	-103	-69	-34							
TOTAL APPREC. CUMULATIVE PIE			-24945	-34026	-39273	-37933	-33144	-22688	-11901	94	13368	29546	
INVEST.ALT	0.20 ANNUAL RT		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	
CUMULATIVE INVESTMENT NOT PV			49925	51046	52272	53613	55080	56525	58210	60173	62462	65129	
CUMULATIVE ROI PIE NOT PV			-10830	-5586	3411	17500	35882	42393	56235	72105	90098	111200	
PV OF INVESTMENT @ YEAR N			49754	50532	51242	51889	52478	52962	53432	53889	54333	54763	
PV OF ROI @ YEAR N, PIE			-9025	-1919	7226	17808	27923	32592	37721	41965	45449	48425	
PV OF ROI @ YEAR N, AFTER TAX			-6317	-1343	5058	12466	19546	22814	26405	29376	31814	33898	
PV % ROI @ YEAR N, PIE			-18.14	-3.80	14.10	34.32	53.21	61.54	70.60	77.87	83.65	88.43	
PV % ROI @ YEAR N, AFTER TAX			-12.70	-2.66	9.87	24.02	37.25	43.08	49.42	54.51	58.55	61.90	

Fig. 4. Example screen with modified financing.

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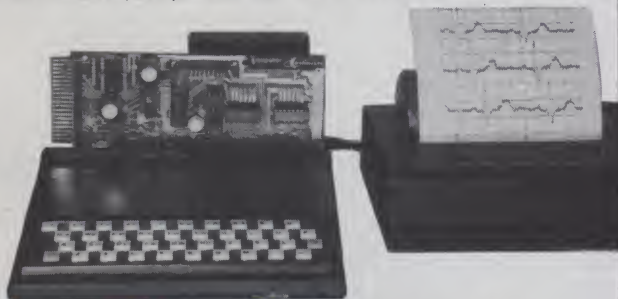
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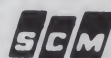
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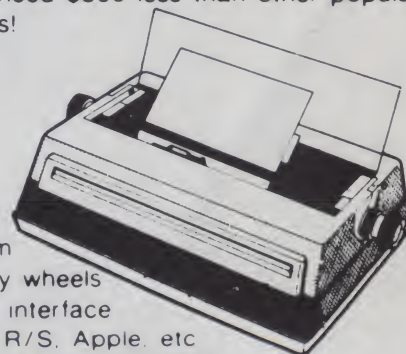
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Commodore and Condominiums

The author wanted to purchase investment property, so he wrote this program for his Commodore to compute rent, mortgage payments, cash flow and tax savings.

By Ed Steinfeld

A few months ago I was in the market to purchase investment property. The type of investment involved rental condominiums, so I decided to use my CBM to compute rent, mortgage payments, cash flow and tax savings.

I first wrote a program to compute the mortgage payment based on a fixed interest rate and duration. The program asked for selling price, down payment, interest rate, loan duration, condo association fees, taxes and insurance.

It then calculated the mortgage payment based on a formula I couldn't do on my pocket calculator, added the monthly expenses and computed what I should charge for rent. My rent calculation included the monthly expenses for mortgage, insurance, taxes and fees. To that it added ten percent for occupancy and maintenance reserves.

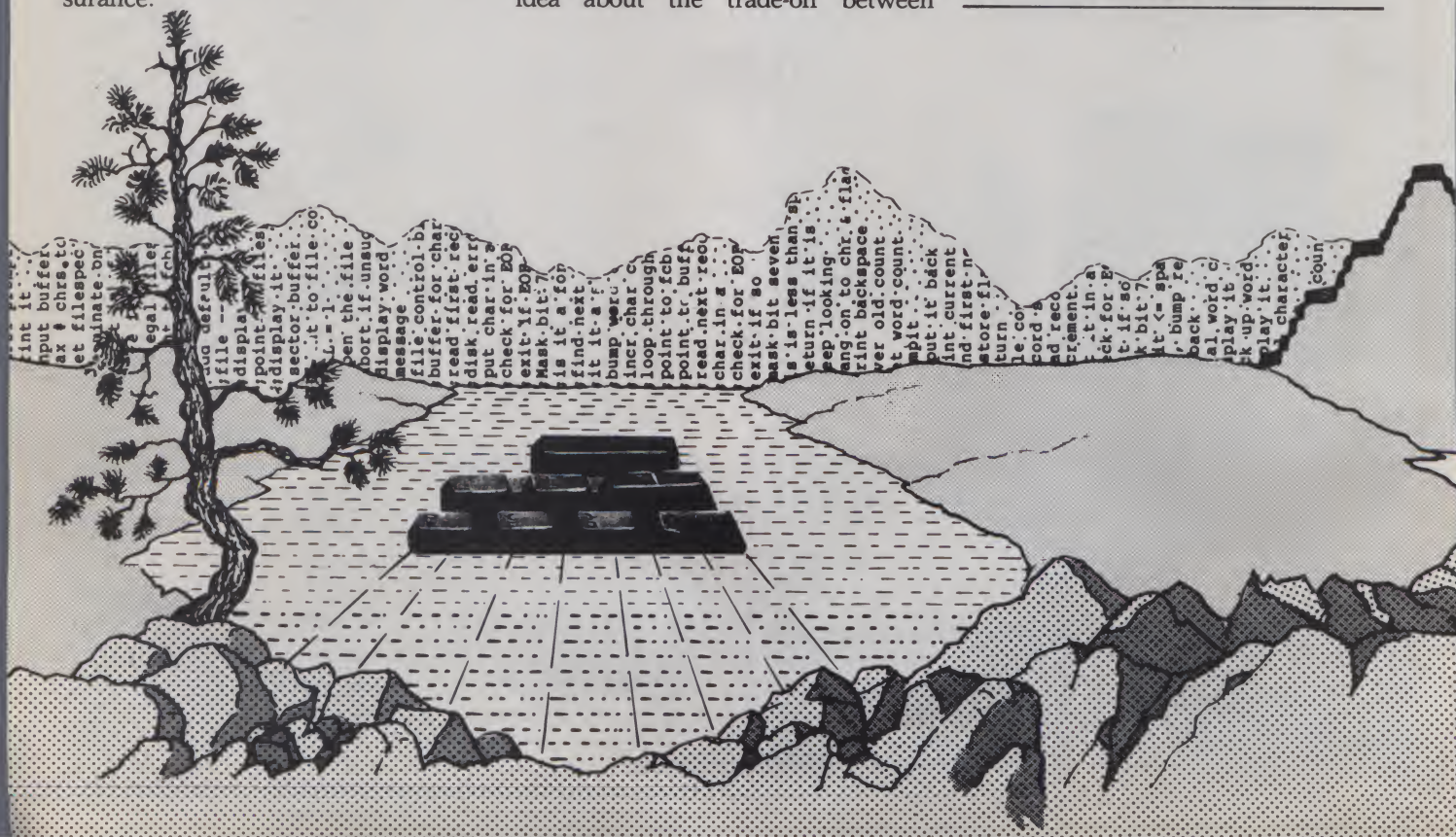
What's the Use?

I used this program to give me an idea about the trade-off between

down payments and monthly expenses. Since I wanted a positive cash flow, this allowed me to compare the computed rent with the average rent currently being charged in the local area.

While I was looking at property, I was also showing the results of the program to realtors. They told me I could afford a negative cash flow, bas-

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ing their claim on the depreciation used on my taxes and the probable appreciation of the property. But I couldn't comprehend how a negative cash flow could be beneficial to me.

I knew I had seen property investment programs in one of the computer magazines. I went through my back issues and found a program by Gregory Glau called Invest (*COMPUTE!* January 1982, Vol. 4 No. 1). At first, it seemed to do everything I wanted it to—mortgage payment, cash flow, tax savings and even return on investment (ROI). Without looking at it closely, I started to enter the program. The first thing I saw was all those data statements—I hate to enter data statements. After entering about a third of them, I took time to find out what they were used for.

The first set of data statements were used to calculate the mortgage payment based on interest intervals of $\frac{1}{2}$ percent. I already had a program to compute the mortgage payment, and the interest I was looking at had a $\frac{1}{4}$ percent fraction. The other data statements were used to compute the equity build-up for the first two years. I wanted a four-year study. Surely, there must be a way to compute equity build-up without having to enter a large number of data statements. After I looked closely at the program, I found it didn't calculate depreciation on the new Accelerated Cost Recovery System (ACRS) method. This

method is now required by the IRS for property put into service after 1981.

The program had some nice features for correcting typing mistakes and it had a nicely formatted output. It could also handle up to three mortgages. Since the amount of data I wanted to enter wasn't too great, and since it involved only one mortgage, I decided to write my own program, but use its output as a guide. It took

It took me
one very long
weekend to
write and debug
my program.

me one very long weekend to write
and debug my program.

Something to Build on

Since I already had a program to compute mortgage payment and proposed rent, I just built on it. If I don't want to compute cash flow and depreciation, the new program lets me either quit or loop back to enter a different down payment, keeping the

other expenses the same.

The additions to the program prompt for (a) the month the property is put into service, (b) the rent decided on, (c) what percentage appreciation is expected per year, (d) first-year closing costs, and (e) the user's tax bracket.

The ACRS depreciation method uses different depreciation rates for each of the first four years, depending on the month the property is put into service. This table of percentages is stored in data statements—but only for 36 items.

The output is to a printer (any CBM or ASCII printer connected via the IEEE-488 bus). The program gives data for four years. Monthly rents, expenses and cash flow are printed. This is followed by equity build-up, appreciation and depreciation. Finally, the tax savings per year and percent ROI are presented.

It wasn't until I saw an ROI of 25 percent to 30 percent per year with a negative cash flow that I finally understood what the realtors were saying.

The equity build-up is done with pure brute force. I compute the interest charged each month and subtract it from the monthly payment to get the amount applied toward the principal—also the equity. A new principal is computed for the next month's interest. When you run the program you



will notice a five to ten second delay at one point while it does the 48 computations and stores the results in two arrays.

The only unusual item in the program is the use of the print using state-

ment. The Skyles Command-O (a ROM that adds additional Basic statements to the Commodore CBM) is turned on and provides the statement. It is available with other similar tool-kits or can be programmed in Basic as

was done for Invest.

This program (Listing 1) is ideal for trying what-ifs. But the final decision on such things as down payments should be made with the consultation of an accountant. ■

Listing 1. Program to analyze rental investments.

```

100 REM NEW RENTALS          9 APRIL 1983
110 REM                      E.F. STEINFELD
120 REM                      31 RICHMAN ROAD
130 REM                      HUDSON, NH 03051
140 REM                      (603) 889-8224
150 REM
160 REM CALCULATES MORTGAGE PAYMENT, MONTHLY EXPENSES,
170 REM SETS RENT, AND FIRST FOUR YEARS OF
180 REM EQUITY BUILD-UP, CASH FLOW, ACRS
190 REM DEPRECIATION, TAX SAVINGS, AND ROI.
200 REM
210 DEF FNR(A)=(INT((A+.005)*100))/100: REM ROUND TO NEAREST PENNY
220 DATA 12,10,9,8,11,10,9,8,10,11,9,8,9,11,9,8,8,11,10,8,7,11,10,8
230 DATA 6,11,10,9,5,11,10,9,4,11,10,9,3,11,10,9,2,11,10,9,1,12,10,9
240 DIM CF(4,6)
250 SYS 9*4096: REM ACTIVATE SKYLES COMMAND-O FOR PRINT USING STATEMENT
260 PRINT "Q":KB=PEEK(59468):POKE59468,12: REM SETS UPPER CASE ONLY
270 INPUT "PROPERTY:      |||||":A$:IFA$=" "GOTO270
280 INPUT "SALE PRICE ($)=  |||||":S:IFS=0GOTO280
290 INPUT "DOWN PAYMENT ($)= |||||":D
300 INPUT "INT. RATE (%) =  |||||":I:IFI=0GOTO300
310 INPUT "TERM (YEARS) =  |||||":N:IFN=0GOTO310
320 INPUT "TAXES/YEAR ($)=  |||||":T:IFT=0GOTO320
330 INPUT "FEES/MONTH ($)=  |||||":F
340 INPUT "INSURANCE/MO.($)= |||||":IN
350 PRINT:PRINT"SET PRINTER TO TOP OF FORM.  PRESS RETURN WHEN READY."
360 GETQ$:IFQ$(<)CHR$(13)GOTO360
370 TM=FNR(T/12)
380 P=S-D:P1=FNR(P)
390 X=P*I/1200
400 Y=(1+I/1200)^(12*N)
410 M=X/(1-1/Y)
420 M=FNR(M)
430 X=(M+IN+TM+F)/.9
440 X=FNR(X)
450 OPEN4,4:PRINT#4:PRINT#4:PRINT#4: REM OPENS PRINTER AS FILE #4
460 PRINT#4,"                                INVESTMENT PROPERTY ANALYSIS":PRINT#4
470 FORM1=1T080:PRINT#4,"%":NEXTM1:PRINT#4:PRINT#4
480 PRINT#4,"PROPERTY:  "A$
490 I$="##### $###.###  ##### $###.###"
500 PRINT USING#4,I$,"SALE PRICE",S,"DOWN PAYMENT",D
510 I1$="##### $###.###"
520 PRINT USING#4,I1$,"PRINCIPAL",P1
530 I1$="##### $###.###  ##### $###.###"
540 PRINT USING#4,I1$,"TAXES/MONTH",TM,"TAXES/YEAR",T
550 I$="##### $###.###"
560 PRINT USING#4,I$,"FEES/MONTH",F
570 PRINT USING#4,I$,"INSURANCE/MO.",IN
580 I1$="##### $###.###"
590 PRINT USING#4,I1$,"INTEREST RATE",I
600 I1$="##### $###.###"
610 PRINT USING#4,I1$,"TERM (YEARS)",N
620 PRINT USING I$,"MORT. PAYMENTS",M
630 PRINT USING#4,I$,"MORT. PAYMENTS",M
640 PRINT USING#4,I$,"MO. EXPENSES",M+TM+F+IN
650 PRINT#4
660 PRINT USING I$,"MO. EXPENSES",M+TM+F+IN
670 PRINT USING I$,"RENT SHOULD BE",X
680 PRINT USING#4,I$,"RENT SHOULD BE",X
690 INPUT"DO YOU WISH TO SHOW CASH FLOW AND DEPRECIATION  N||||":Q$
700 IFLEFT$(Q$,1)="N"GOTO4000
710 INPUT"WHAT MONTHLY RENT WILL YOU USE  |||||":RE
720 PRINT"WHAT MONTH WILL THE PROPERTY BE PLACED IN SERVICE?"
730 INPUT"(JAN=1, FEB=2, ETC.)  1||||":M3
740 PRINT"WHAT AMOUNT OF THE $"S" SALES PRICE IS ALLOWED UNDER THE ACRS"
750 INPUT"15 YEAR DEPRECIATION METHOD ($)":S1
760 INPUT"WHAT ARE THE ESTIMATED SETTLEMENT COSTS  |||||":CL
770 GOSUB5000: REM CALCULATE EQUITY BUILD-UP FOR FIRST FOUR YEARS
780 GOSUB6000: REM READ ACRS DEPRECIATION TABLE FOR FIRST FOUR YEARS
790 GOSUB6200: REM CALCULATE DEPRECIATION
800 GOSUB6400: REM CALCULATE CASH FLOW
810 INPUT"WHAT % PER YEAR PROPERTY APPRECIATION DO YOU EXPECT  |||||":AP

```

More

Listing continued.

```

20 INPUT "WHAT TAX BRACKET (%) ARE YOU IN";TX
830 PRINT#4:FORM1=1T060:PRINT#4,"%":NEXTH1:PRINT#4:PRINT#4
840 PRINT#4,"CASH FLOW ANALYSIS FOR PROPERTY: "A$
850 PRINT#4:PRINT#4,"ESTIMATE BASED ON THE PROPERTY BEING PUT INTO SERVICE";
860 PRINT#4,12-M3+1" MONTHS THE FIRST YEAR."
870 PRINT#4,"RENT HAS BEEN SET AT $"RE" PER MONTH. ESTIMATED APPRECIATION ";
880 PRINT#4,"IS"AP"% PER YEAR."
890 PRINT#4,"DEPRECIATION IS CALCULATED ON THE ACCELERATED COST RECOVERY ";
900 PRINT#4,"SYSTEM (ACRS) METHOD"
910 PRINT#4,"FOR 15-YEAR PROPERTY. SETTLEMENT COSTS ARE ESTIMATED AT $"CL"."
920 PRINT#4:PRINT#4
930 I1$="                YEAR 1          YEAR 2          YEAR 3          YEAR 4"
940 PRINT#4,I1$
950 I$="##### ##,###.## ##,###.## ##,###.## ##,###.##"
960 PRINT USING#4,I$,"MONTHLY RENTS",CF(1,1),CF(2,1),CF(3,1),CF(4,1)
970 PRINT#4
980 PRINT USING#4,I$,"MORTGAGE",CF(1,2),CF(2,2),CF(3,2),CF(4,2)
990 PRINT USING#4,I$,"TAXES",CF(1,3),CF(2,3),CF(3,3),CF(4,3)
1000 PRINT USING#4,I$,"FEES & EXPENSES",CF(1,4),CF(2,4),CF(3,4),CF(4,4)
1010 PRINT USING#4,I$,"INSURANCE",CF(1,5),CF(2,5),CF(3,5),CF(4,5)
1020 PRINT#4
1030 PRINT USING#4,I$,"CASH FLOW",CF(1,6),CF(2,6),CF(3,6),CF(4,6)
1040 PRINT#4:PRINT#4
1050 PRINT#4,"RETURN ON INVESTMENT FOR "A$
1060 PRINT#4
1070 PRINT#4,I1$
1080 PRINT USING#4,I$,"CASH FLOW",CF(1,6),CF(2,6),CF(3,6),CF(4,6)
1090 PRINT USING#4,I$,"EQUITY BUILDUP",X(1),X(2),X(3),X(4)
1100 AP(1)=5*(AP/100)*(12-M3+1)/12: REM 1ST YEAR APPRECIATION
1110 FORM1=2T04:AP(M1)=5*(AP/100):NEXTH1
1120 PRINT USING#4,I$,"APPRECIATION",AP(1),AP(2),AP(3),AP(4)
1130 PRINT USING#4,I$,"DEPRECIATION (ACRS)",D(1),D(2),D(3),D(4)
1140 PRINT#4
1150 PRINT#4,"ESTIMATED TAX BRACKET IS"TX%"
1160 PRINT#4
1170 FORM1=1T04:TX(M1)=D(M1)*TX/100:NEXTH1
1180 TX(1)=TX(1)+CL*TX/100
1190 PRINT USING#4,I$,"TAX SAVINGS",TX(1),TX(2),TX(3),TX(4)
1200 PRINT#4
1210 FORM1=1T04:RO(M1)=CF(M1,6)+X(M1)+AP(M1)+TX(M1):NEXTH1
1220 PRINT USING#4,I$,"RETURN ON INVESTMENT",RO(1),RO(2),RO(3),RO(4)
1230 PRINT#4
1240 PRINT#4,"DOWN PAYMENT = $"D
1250 PRINT#4
1260 I$="##### #####.##% #####.##% #####.##% #####.##%"
1270 FORM1=1T04:RI(M1)=FNR(100*RO(M1)/D):NEXTH1
1280 PRINT USING#4,I$,"PERCENT R O I",RI(1),RI(2),RI(3),RI(4)
1290 PRINT#4
1300 FORM1=1T060:PRINT#4,"%":NEXTH1:PRINT#4:PRINT#4
2000 :
4000 PRINT:INPUT"ANOTHER FOR THIS PROPERTY (Y OR N) N####";Q$:Q$=LEFT$(Q$,1)
4010 PRINT#4,CHR$(12):CLOSE4
4020 IFQ$="Y"THENPRINT:PRINT:INPUT"DOWN PAYMENT ($) = 0####";D:GOTO360
4030 POKES9468,KB:END: REM RETURN CASE TO ORIGINAL
4200 :
5000 FORM1=1T04:X(M1)=0:T(M1)=0:NEXTH1
5010 M4=M3:FORM2=1T04:GOSUB5020:NEXTH2:RETURN
5020 FORM1=12TOM4STEP-1
5030 IT=(I/1200)*P
5040 X(M2)=X(M2)+M-IT
5050 P=P-(M-IT)
5060 T(M2)=IT+T(M2)
5070 NEXTH1
5080 T(M2)=FNR(T(M2)):X(M2)=FNR(X(M2))
5090 M4=1
5100 RETURN
5200 :
6000 RESTORE:FORM1=1TOM3:FORM2=1T04:READO%(M2):NEXTH2:NEXTH1:RETURN
6050 :
6200 FORM1=1T04:D(M1)=FNR((O%(M1)/100)*S1):NEXTH1:RETURN
6250 :
6400 REM CF(YEAR,RENT - MORTGAGE - TAXES - FEES - INSURANCE - CASH FLOW)
6410 M1=12-M3+1
6420 CF(1,1)=RE*M1:CF(1,2)=M*M1:CF(1,3)=TM*M1:CF(1,4)=F*M1:CF(1,5)=IN*M1
6430 CF(1,6)=CF(1,1)-CF(1,2)-CF(1,3)-CF(1,4)-CF(1,5)-CL
6440 FORM1=2T04
6450 CF(M1,1)=RE*12:CF(M1,2)=M*12:CF(M1,3)=T:CF(M1,4)=F*12:CF(M1,5)=IN*12
6460 CF(M1,6)=CF(M1,1)-CF(M1,2)-CF(M1,3)-CF(M1,4)-CF(M1,5)
6470 NEXTH1
6480 FORM1=1T04:FORM2=1T06:CF(M1,M2)=FNR(CF(M1,M2)):NEXTH2:NEXTH1
6490 RETURN
READY.

```


Pick Apart Those Apple Interface Problems

By using the DOS enhancements Magic Window II and DiversiDos, the author had an easy time interfacing copy-protected Apple software.

By Ted Carnevale

Given the large number of hardware and software accessories available for the Apple, interfacing problems are bound to occur. Many hardware manufacturers have taken this into consideration and have made their products compatible with as many related devices as possible. Printer cards are a prime example of this: one popular card works with printers made by eight other manufacturers.

Software interfacing can be difficult, partly because of the proliferation of copy-protection schemes. How often have you wished you could take advantage of the special features of program A and still be able to use program B?

This is a special problem where DOS enhancements are concerned. Many experienced Apple users have "fine-tuned" DOS, adding special routines for a variety of purposes. With the proper patch, you can have a catalog listing that shows the number of free sectors on a disk, use wild cards in DOS commands, expand disk capacity to 40 tracks, speed up disk reads and writes—and you don't have to be a whiz at assembly language, since many of these patches are part of easily installed software packages in the \$20–40 price range.

All of these conveniences may disappear when you try to run protected software. Because copy protection generally involves changing the DOS routines for disk reading and writ-

ing, booting a protected disk may wipe out all the patches in your personalized DOS.

Getting Around the Problem

This article tells how I got around this problem with Magic Window II and DiversiDos. The same general approach may also work with other combinations of DOS enhancements and copy-protected software.

DiversiDos lives
up to its promise.
It increases disk
read/write speed.

From the reviews, Magic Window II (MWII) sounded like the word processing program for me. The dealer's demonstration convinced me: it is suitable for almost any professional use. It has a true screen-oriented editor that shows exactly what the printout will look like.

Cursor control keys are arranged logically. Most editing functions require only a single keystroke. Menus are helpful but not obtrusive. Portions of manuscripts can be excerpted, merged and inserted selectively. A reasonable amount of text can be handled at one time (over eight single-spaced pages with 64K RAM). Longer

manuscripts can be made up of subunits that are linked together at print time by means of a print list. The print function supports several different printers.

After using MWII for a couple of months and slogging through many revisions of a long paper, I wanted faster disk access. Also, disks were filling up quickly with manuscript outlines, drafts and revisions, so more disk space would be helpful.

About the same time I ran across reviews of DiversiDos, a product of Diversified Software Research (DSR). This enhancement of DOS 3.3 promised faster disk read/write speed with almost any type of file. It has an optional patch to display the number of free sectors with every catalog. It can also be patched to increase the number of tracks on a disk from 35 to 40 (assuming your disk drives can handle the inner five tracks), adding 80 more sectors of usable space. Furthermore, it can be used to create DOSless data disks, thereby freeing up another 32 sectors. Finally, it costs only \$30!

DiversiDos lived up to its promise. The improvement in disk read/write speed was noticeable when dealing with long Applesoft, text or binary files. The problem was getting it to work with MWII.

Address correspondence to Ted Carnevale, Neurology Dept., SUNY, HSC T12 Room 020, Stony Brook, NY 11794.

First, I tried the obvious: booting DiversiDos and then booting the Magic Window system master disk with PR#6. This failed, since a copy of the old DOS 3.3 on the MWII disk overwrote DiversiDos and restored the slow file handling I wanted to avoid.

This cannot be overcome by simply writing DiversiDos over the DOS tracks of the MWII master. Since the master disk is copy-protected, writing over tracks 0-2 makes it impossible to load Magic Window and destroys the master disk.

I asked Bill Basham of DSR (the developer of DiversiDos) if he had any suggestions. He said that he hadn't had the opportunity to look into it, but he thought that extensive revisions of MWII might be necessary to make it run under DiversiDos.

Discouraged, I put up with the slow

How often have you wished
you could take advantage
of the special features of
program A and still be able
to use program B?

disk routines in MWII for a while. Then, after another lengthy manuscript, I got tired of listening to the disk drives grind away and decided to try DiversiDos one more time.

Finding a Clue

The answer finally started to become clear after close study of the installation notes that came with MWII and DiversiDos. According to DSR's documentation, certain protected disks can be run by first booting DiversiDos and then running a start-up program on the protected disk. Did MWII have such a program?

The MWII system master has a file called BRUN MW2. This is intended for users with hard disks who won't appreciate having the old DOS (which knows nothing about hard disks) suddenly reappear every time MWII is loaded, thereby making their expensive hardware useless.

Since I didn't have a hard disk drive, I had previously ignored the section in the MWII installation notes that referred to this file. Now, however, it seemed to offer a solution to the problem.

File type	formatted (B)				unformatted (T)			
Text length: pages	1	2	4	8	1	2	4	8
sectors	15	23	48	93	14	22	47	92
Read times (seconds):								
Standard DOS	7	10	15	27	11	20	40	76
DiversiDos	4	5	6	8	14	23	42	80
Write times (seconds):								
Standard DOS	9	12	19	33	15	22	39	66
DiversiDos	4	5	5	8	12	15	20	32

Table 1. Disk read and write times using standard DOS 3.3 and DiversiDos. Text size is given in 256-byte sectors and in units of standard 8½ × 11 inch pages (each page equals 54 lines of single-spaced text 64 columns wide). Times are measured to the nearest whole second. Note that DiversiDos is much faster than standard DOS except when reading unformatted (T) files. Also note that formatted files are handled more quickly than unformatted files with either DOS, even though a formatted file (type B) is one sector longer than an unformatted file (type T) containing the same amount of text.

So I booted up the DiversiDos disk, exited to Basic, and switched to the MWII master. The command BRUN BRUN MW2 produced some disk activity, and then the familiar MWII system option menu appeared. Loading the slave driver disk, I pressed return and was rewarded by the appearance of the main editing menu.

A Neat Solution

To automate the process of loading DiversiDos before running MWII, I followed a suggestion from DSR's manual and created a preboot disk with DiversiDos on tracks 0-2. I did this by booting the DiversiDos master, choosing the free-sector option and then exiting to Basic.

Since I have 40-track drives, I wrote this program and saved it onto the DiversiDos master disk as PRE-INIT 40:

```
10 HOME
20 PRINT "40 track pre-init"
30 POKE 44725,160
40 POKE 48894,40
50 POKE 46063,40
60 IF PEEK (48352) = 140 THEN POKE
   48352,160
70 PRINT
80 PRINT "Ready to INIT a 40 track disk"
90 PRINT "with DiversiDos"
```

I run this program before INITING a disk. If you do not have 40-track drives, you should skip this step.

I then used INIT HELLO to put DiversiDos onto a new blank disk. Next, I wrote this program and used SAVE HELLO to write it onto the DiversiDos slave:

```
10 HOME
20 PRINT "DiversiDos pre-boot for Magic
   Window II"
30 PRINT "40 track/free sector version"
```

```
40 POKE 48352,160
50 PRINT
60 INPUT "Press RETURN";A$
70 PRINT CHR$(4);"CATALOG"
80 PRINT
90 PRINT "Put MWII System Master Disk"
100 INPUT "in drive 1 and press
   RETURN";A$
110 PRINT CHR$(4);"BRUN BRUN MW2"
```

Line 40 adjusts the free sector routine for 40 tracks. If you use 35-track drives, this line should be left out and you should change line 30 appropriately.

When this disk is booted using PR#6, it displays this message:

DiversiDos preboot for Magic Window II
40 track/free sector version

Press RETURN

After you press the return key, a catalog of the preboot disk appears along with the number of free sectors on the disk. Following the last catalog entry you will see:

Put MWII System Master Disk
in drive 1 and press RETURN

If you do what it says, MWII will load and you are ready to go.

Now it took three separate disks to boot up MWII: the DiversiDos preboot, the system master disk, and the slave driver disk. Having to use two disks to get things running is bad enough, but three seemed almost intolerable. What could I do about this?

Magic Window uses three files called SYS.Options, Video and Printer on the slave driver disk to tell it such things as what sort of video display or printer

you are using. Fortunately, the installation routines on the driver master disk can write these to a disk that already contains a DOS and other files without destroying them. So I just used the driver master to put these files on the DiversiDos preboot disk.

Checking the Solution

As far as I can tell, MWII runs without a hitch under DiversiDos, even if you include the 40-track patch (see below). The maximum file size is unchanged. The only differences are quicker disk access (see Table 1) and, if your drives can handle tracks 35-39, more disk space. DiversiDos's free sectors routine works properly, too. This is quite handy since the catalog command can be invoked any time from within MWII to see how much disk space is left.

I timed disk reads and writes using portions of a recent manuscript to see how much faster things really were (see Table 1). Magic Window's formatted (type B) files read and write two to four times faster with DiversiDos. The only surprise is the slightly slower reading of unformatted (type

T) files. The improvement in writing time more than makes up for this for all but the shortest unformatted files.

Now I can take advantage of the speed of DiversiDos when program-

You may be able to keep
your DOS's bells and
whistles if your
copy-protected program
has an alternate boot method.

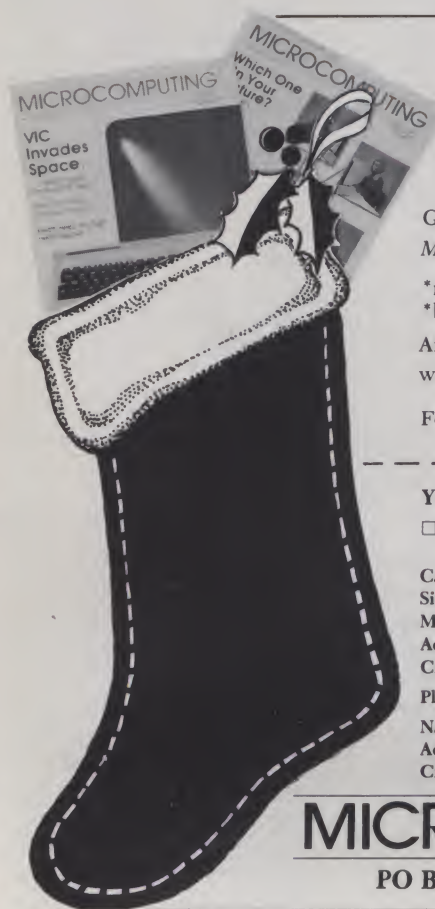
ming or writing manuscripts. It has been well worth the effort. I haven't tried some of the fancier features of DiversiDos, such as the keyboard and print buffers, but you might want to experiment with them.

The success of this software combination suggests a general approach to the problem of interfacing DOS enhancements with other copy-pro-

ected programs. A key to the solution was the program BRUN MWII, which allowed Magic Window to be used with a hard disk system without resorting to rebooting the system with the PR#6 command. Any program that can be loaded without doing a cold boot or using PR#6 has the potential to be used with your favorite custom DOS.

The other key to this solution was the fact that Magic Window appears to use standard DOS routines for most disk reads and writes (except for unformatted files). Therefore, custom patches to these routines are unaffected by the presence of Magic Window. Conversely, this also means that direct I/O with peeks and pokes or special hardware drivers that bypass DOS will also circumvent your custom patches. This seems to be the reason why DiversiDos failed to speed up the reading of unformatted files.

In conclusion, you may be able to keep your DOS's bells and whistles if your copy-protected program has an alternate boot method. Programs that may be used with hard disks are likely to have this capability. ■



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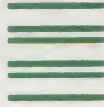
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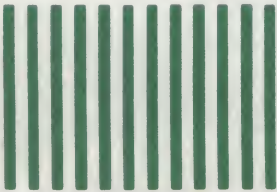
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Is the Future At Your Fingertips?

Mouses and light pens may be things of the past. The Hewlett-Packard HP-150 takes advantage of the ultimate pointing device—your finger.

By Jim Heid
Microcomputing Technical Editor

Because keyboards are considered awkward and intimidating for inexperienced computer users, computer designers have always looked for a way to improve the method used to supply commands to a computer.

The light pen, the first widely used pointing device, never quite caught on because of its marginal reliability and cumbersome umbilical cable.

The mouse improved on reliability, but still required a connecting cable and still didn't represent the ultimate goal—eliminating the mechanical middleman between the user and the computer.

Computer designers were missing the boat. They were searching for a device that would let the user select options by simply pointing at them. They seemed to forget that the ultimate pointing device had already been designed and was at their fingertips.

Touching on a Solution

The Hewlett-Packard HP-150 is the first microcomputer to use touch-screen technology. Trademarked under the name HP Touch, the HP-150's touch screen lets you select options and perform tasks by simply touching words, pictures or boxes that appear on the screen.

The bezel that surrounds the computer's screen is lined with small infrared light-emitting diodes on one side, and with light-sensitive photo diodes on the other side (see Photo 1).

This produces an invisible grid of light in front of the screen. There are

40 diodes along the screen's horizontal axis and 24 along the vertical axis, making the screen touch-sensitive for each line of the display and for every other column. When you touch a point on the screen, the computer determines which point you touched by determining which light beams are blocked.

Inside the HP-150

The heart of the HP-150 is an Intel 8088 microprocessor running at a swift 8 MHz. The computer contains 256K of memory (expandable to

640K), two 270K, single-sided, 3½-inch disk drives, two RS-232C serial ports and one Hewlett-Packard interface bus port.

It also contains two expansion slots that can house additional memory or options like networking boards and modems. The complete system occupies only 1.7 square feet of space and has a suggested retail price of \$3995. Table 1 contains a summary of the HP-150's features.

The HP-150's keyboard was designed to offer full use of the computer with or without the touch screen. It has 107 keys, including editing keys, a cursor-



The Hewlett-Packard HP-150 is the first microcomputer to offer touch-screen technology.

control cluster, an 18-key numeric keypad, and eight programmable function keys. The typing angle is adjustable. The keyboard is controlled by its own microprocessor, which is located in the system unit.

The Screen

The video display is the HP-150's star attraction. Measuring only nine inches diagonally, the green phosphor screen seems small at first. With a text resolution of 720×378 and a bit-mapped graphics resolution of 512×390, however, its display is as crisp and easy to read as any. The screen can display 27 lines of 80 characters each, with each character formed by a 7×10 matrix within a 9×14 character cell.

The bottom line of the screen displays system-status messages, and the two lines above it can be designated as softkeys—screen areas that can be programmed to send commands when the screen is touched. Like the keyboard, the video display is controlled by its own microprocessor, freeing the 8088 for other tasks.

Expansion Options

The HP-150's microfloppy disks can be supplemented by 5¼- or eight-inch floppy disk drives, and by five- or 15-megabyte hard disks. Since the Hewlett-Packard interface bus (HP-IB) lets you daisy-chain these peripherals, the HP-150's mass-storage capabilities are nearly unlimited.

An optional emulator card lets you link the HP-150 to an IBM mainframe computer. This IBM 3278 accessory card provides a direct coaxial-cable connection to the host computer, which can operate with remotely or locally attached controllers.

A unique option of the HP-150 is its user-installable thermal printer that fits in the top of the video monitor. The printer is fast and quiet, and it can print graphics as well as text.

Software

Hewlett-Packard has learned that even a sophisticated computer is useless without software. The HP-150 uses MS DOS 2.0, making it possible for the HP-150 to run many existing programs. In fact, software written for the IBM PC will run on the HP-150 as long as the software doesn't depend on specific IBM hardware features

Price: \$3995.

Dimensions: System unit, including monitor, 12×12×11 inches, 21 pounds.

Processor: Intel 8088, running at 8 MHz.

Memory: 256K, expandable to 640K.

Display: Nine-inch (diagonal) green-phosphor monitor, 27 lines by 80 characters.

Resolution: 512 by 390 (graphics), 720 by 378 (text).

Keyboard: 107 keys, detached, auto-repeat, numeric keypad, eight function keys, n-key rollover. Six-foot cable.

Mass storage: Two 270K, 3½-inch disk drives.

Input/Output ports: One RS-232C only, one RS422/RS-232C (combined), one HP-IB (IEEE-488) port.

Operating system: MS DOS 2.0 with PAM shell.

Expansion: Two slots free.

Table 1. Summary of the features of Hewlett-Packard's HP-150.



Photo 1. The Hewlett-Packard HP-150. The holes for the HP Touch sensors can be seen on the screen's bezel.

Hewlett-Packard has
learned that even a
sophisticated computer
is useless without
software.

and uses standard MS DOS system routines. The HP-150's graphics resolution is different from IBM's, however, so programs that rely on graphics displays generally aren't compatible.

The HP-150 is packaged with MS DOS 2.0, Microsoft Basic and an operating system shell called Personal Applications Manager (PAM). PAM provides a link between you and MS DOS; it lets you use the touch screen to select application programs, back up and copy files and disks, and install programs.

Instead of seeing the familiar and cryptic A> prompt, you see a number of boxes, each containing a message like COPY/BACKUP, MS DOS COMMANDS, FORMAT and so on. Other boxes contain the names of applications programs. You can run a program or perform a task by simply touching the box that corresponds to the program or task desired.

The utility programs that actually copy and format disks have also been enhanced to use HP Touch. The disk

A communications program called DSN/Link is also available. DSN/Link lets you transfer both ASCII and binary files by simply touching the file names to be transmitted and specifying the destination.

Software vendors are in the process of converting many popular programs to use HP Touch. Enhanced versions of dBase II, 1-2-3 and Context MBA

The touch screen represents a vast improvement in the user interface. Combined with the PAM *operating* system shell, it brings computer power to noncomputerists without the need for condescending icons and inconvenient mice. In its search for the ultimate pointing device, Hewlett-Packard has definitely put its finger on something. ■



Photo 2. Using the touch screen to design graphics.

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Stepping Out

The Next Step, from Execuware, is a program generator for the nonprogrammer who wants customized database management and data reporting programs for his IBM PC

By Frank J. Derfler, Jr.

Program generators are a part of the evolution of software that follows the emergence of higher-order languages such as Basic and Cobol.

In company with modern database management systems, program generators go several steps further along the path toward making computers flexible and responsive to nontechnical users.

The Next Step package is a program generator from Execuware that creates database management and data reporting programs for the IBM Personal Computer.

The product of Next Step is another series of programs that accepts your data inputs, sorts and arranges the data, and presents it in different for-

mats you design.

The Next Step is aimed at the novice user and is presented in a manner that requires no previous programming experience. You don't have to know a programming language or even learn an extensive command language associated with the database management system in order to create your own applications. The Next Step software understands enough from your screen and keyboard inputs to write the code for the programs it creates.

Both the Next Step program and the programs it creates are easy to use. The steps required to generate a program are presented as a series of questions and options.

The final database programs and

reports are generated in Microsoft Basic. They can be used as created with the IBM Basic interpreter or they can be compiled using the Microsoft Basic Compiler available from IBM. You can use Next Step to design your own customized inventory control, credit record, library index, family tree or even personal accounts payable systems.

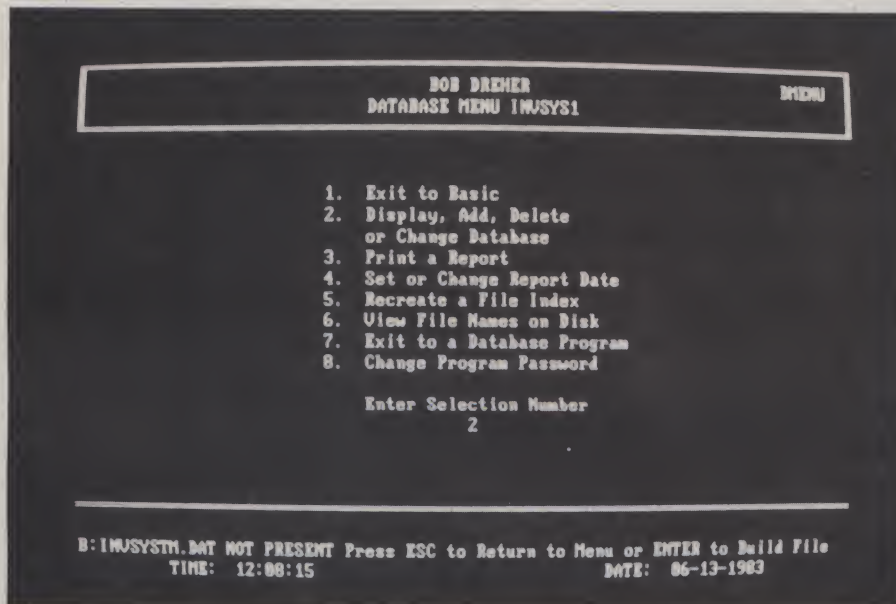
Superior Features

The database creation process and the Next Step program itself are both divided into two distinct parts. The first part handles the creation of the database and data-entry formats. The second part of the program creates the reports derived from the data.

The database creation portion of the program has three outstanding features. First, the input screens and the database are designed according to the format and relationships you describe graphically on the screen. Second, you can choose special filter and editing criteria, including data editing, range editing or table editing of specified or numeric fields. Third, basic record retrieval is fast. It is done through a technique known as B tree file access, and no special reorganization of the data is required.

The Next Step has features that are in many ways superior to other database managers. Records can contain up to 510 characters and 99 data fields. The program can use up to 15 keys to sort and recall data. Complex formulas can be entered using the standard four arithmetic functions and exponential numbers.

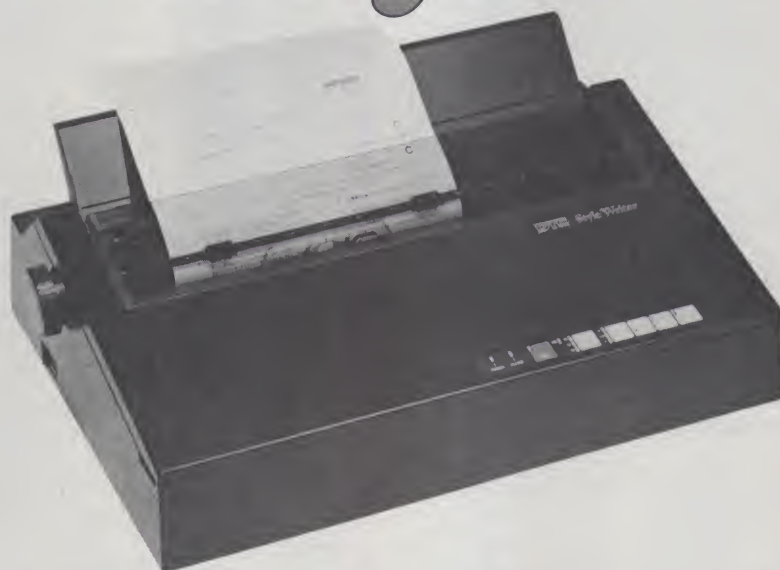
You can use Next Step to generate



The Next Step main menu lets you select from the many system creation, modification and operation options available. Note that you can also view the disk directory and gracefully exit to Basic from the menu. It is surprising how many programs do not include these functions. The bottom status lines contain valuable system information and appear through all levels of operation.

Contact the author at PO Box 691, Herndon, VA 22070.

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current function of each of the special function keys is described on the bottom lines of the screen when needed. The program is both menu- and question-driven. The menu screens are well designed and easily understood. At the same time, the menus are short and grouped so that experienced users don't waste time wading through layers of menus when they know what they want to do.

Once you have selected your function from the menu, the design process is guided by a series of questions that help you to formulate your screens and create your formulas.

The formulas are entered in a manner similar to most spreadsheet programs. Formulas can be written to create interim results that are not written to the screen but are used for further calculations. The formula function adds great power to the resulting program and sets Next Step apart from other file management programs.

The display of the database or reports program is quite simple to design, although some study time should be spent to understand the program's change function before changes or updates are attempted. Editing is accomplished as you finish the design of each screen or any time you decide you need to use a different format. Editing functions not only include text and numeric fields, but also tables, range edits and default edits you can use if you only need a standard data or text entry format.

Database Creation

Actual creation of a database system is accomplished by painting the screen with the formats you need to input, correlate and report the data. The program starts with a display that somewhat resembles a spreadsheet, but is limited to 78 characters horizontally. You may select any screen position to begin the description of the data entry format you need.

The standard title format for the screen uses the first, second and fourth lines. You can specify boxes on the screen for all data entry positions and enter specific categories of alphanumeric or numeric characters that will be required for all data. In operation, the program will inspect each entry to insure that it meets the category and limits you defined for that position.

Further development of your database is done through on-screen calculations and file sorts. The calculation

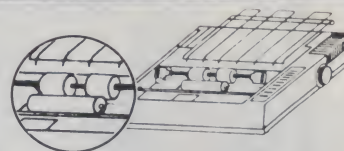
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areas enable you to select specific fields used to calculate important report data. The file specification area consists of on-screen questions, giving you the opportunity to select a specific program and file name, disk drive lo-

cation, password security and screen heading.

Once the key fields and editing criteria have been defined, you are ready to generate the program. From this point, the Next Step takes over and in

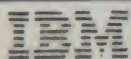
BOB DREHER WEEKLY INVENTORY SYSTEM							
PRODUCT	COST	MON	TUE	WED	THU	FRI	TOTALS
THE NEXT STEP	8295.00	001	002	000	001	000	1188.00
REL EST AML PKG	8149.95	000	001	002	001	003	1049.65
FINCL AML PKG	0092.95	000	000	001	000	000	92.95
KNOW YOUR CLMT	0092.95	001	000	000	000	000	92.95
ECOM ORD QNTY	0092.95	000	000	000	000	001	92.95
WEEKLY TOTAL SALES							2500.50
F2=Change F3=Delete F5=Get Next Rec F6=Get Prev Rec ESC=Exit END=Help TIME: 21:39:29 DATE: 06-13-1983							

In this screen, the account title, cost and sales data have been entered according to the formatted boxes. The totals are computed by formulas entered when the screen was created.

A black and white advertisement. On the left, a cutout of Charlie Chaplin in his iconic bowler hat, mustache, and dark suit is climbing a wooden ladder. He holds a cane in his right hand. The ladder is positioned against a large VHS tape that occupies the right half of the image. The tape has a white label at the top with the text "YOUR PROGRAM HERE" in bold, black, sans-serif capital letters. Below the label is a large, clear circular window, and further down is a smaller, dark oval-shaped window. The background is a plain, light color.

YOUR PROGRAM HERE

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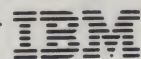
User Memory 64K-640K bytes	Display Screens Color or monochrome High-resolution 80 characters x 25 lines Upper and lower case	Permanent Memory (ROM) 40K bytes
Microprocessor 16-bit, 8088		Color/Graphics <i>Text mode:</i> 16 colors 256 characters and symbols in ROM <i>Graphics mode:</i> 4-color resolution: 320h x 200v Black & white resolution: 640h x 200v Simultaneous graphics & text capability
Auxiliary Memory 2 optional internal diskette drives, 5¼" 160KB/180KB or 320KB/360KB per diskette	Operating Systems DOS, UCSD p-System, CP/M-86†	Communications RS-232-C interface SDLC, Asynchronous, Bisynchronous protocols Up to 9600 bits per second
Keyboard 83 keys, 6 ft. cord attaches to system unit 10 function keys 10-key numeric pad	Languages BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL	
Diagnostics Power-on self testing Parity checking	Printer All-points-addressable graphics capability Bidirectional 80 characters/second 18 character styles 9 x 9 character matrix	

So, if you think your software is the best, consider submitting it. If it's accepted, we'll take care of the publishing, the marketing and the distribution. All you have to do is reap the benefits of our royalty terms. And you're free to market your program elsewhere *at any time* even if you license it to us.

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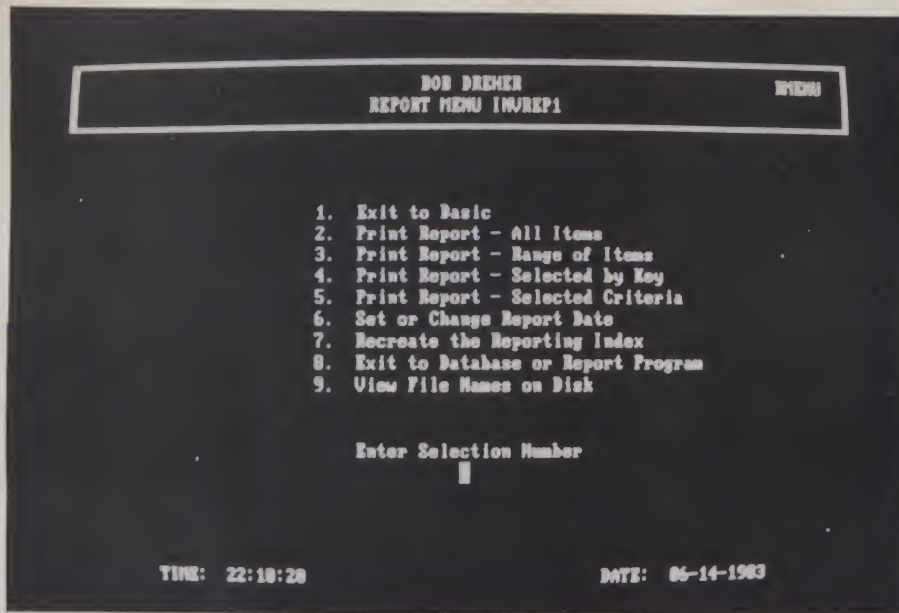
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The report menu gives many options for the selection of data. Standard reports can be designed and run on a regular basis, or special queries can be made as needed.

eight to ten minutes, depending on the size of the database you've created, the files are written to disk. The actual number of files depends on the parameters you've defined, such as reports and password protection, but

usually a minimum of five files are created.

The Next Step has an excellent manual. It gains friendliness from quality illustrations that guide you through program creation and execution. The

tutorial portion of the manual provides additional information that should assist you in program development. I think more attention could have been given to the change function that is used to change data or to correct errors made in initial program definition, but this function is easy to use after you run through it once. You'll need this function during your first attempts at database creation!

If problems arise during data entry, indicating programming errors or the need for additional screen information, the reference information section of the documentation is helpful. The first attempt at the process of creating and perfecting a database will probably yield in incomplete results, but careful reading of the text and preparation of the original database information can speed the process. The section of the manual on database concepts is useful. It will help you better organize your thought process and improve future program creation.

Data input is quite simple and allows changes to be made without disrupting the program. When you begin data input, you will find out how well your thought process survived during

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program definition.

Report Generation

The initialization and setup of the report format is similar to the process followed for the database program. The screen is painted with the required data set in specific locations.

The difference is that you now use the number associated with each item you put into the database to locate and sort the information. This allows total freedom in format arrangement regardless of how the original data was displayed. Key specifications can be redefined for the report and new screen calculations can be made.

The report format allows page breaks, totals, page headings, multiple-line columns and column headings that aren't restricted by the field size. The process is again totally menu-driven and requires user selection to continue so you can be sure you're finished with a specific area before going on to the next.

Attention to detail is an important consideration in database and report design. You should carefully proof-read and understand the report design, review the calculations, and un-

derstand the ability to add text before you finish up with the ESC option.

It's easy to go past the area that allows you to add text to your screens without realizing it. Although this is frustrating, you can easily go back by using the "C" change report option during start up to make the appropriate inputs. Remember to go through the entire program each time you start the report program generation process so you don't lose your initial work. It could be helpful to use the IBM PC's PrtSc function to make copies of your screen entries as you go along. This gives you a copy of your work in case you are interrupted or have a problem in format or data that you can't solve. Practice makes perfect with the Next Step program and with just a little practice, program generation is a snap.

A Confidence Builder

Today, database management systems and new "spreadbase" applications programs have become popular. Building your confidence with many of these programs requires hours of learning that you don't have.

The Next Step by Execuware offers

an excellent alternative to these programs, since the database and report programs are actually created and customized by the user. The user-created attribute means that the program can be made to function to create reports exactly as the end user needs them without having to change requirements to conform to the program in use.

Although The Next Step also requires invested time to fully understand the text input and editing functions, the time is short and well spent. Once you get a working knowledge of how the program generator functions, you can create the kind of database and report formats you need to solve your particular requirements.

A Step Forward

The Next Step should be considered as your best step toward user-created database programs for both personal and professional use. Developed by Execuware, the Microcomputer Software Division of Aeronca, Inc., The Next Step is distributed exclusively by Starsoft Software Distributors, 4984 El Camino Real, Suite 125, Los Altos, CA 94022. It sells for \$295. ■

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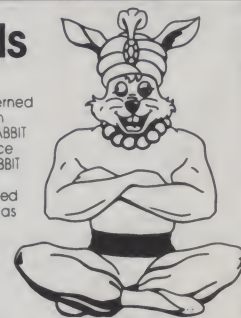
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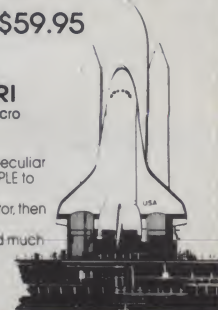
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Kaypro Steps Up Its Software

To take advantage of its ten megabytes of hard disk memory, Kaypro has introduced a new assortment of software to be bundled with the Kaypro 10. The author describes what to expect on the software side of this powerful transportable computer.

By Bob Hickey

I just got hold of Kaypro's new assortment of software for the Kaypro 10. As I reported in last month's issue of *Microcomputing*, Kaypro has begun shipping a different combination of software with the hard disk transportable computer. The bundled software now includes:

- WordStar The word processor—an old established favorite in the computer field.
- The Word+ One of the best spelling checker/correctors on the market today with a family of associated extra word-help programs.

● CBasic

A Basic used in many business applications. It needs line numbers only when the lines are called in the program itself.

● MicroPlan

A menu-driven financial planning program; it has some programming and statistical capabilities included.

● MBasic

This is a Basic language that most people find easy to learn as a first computer "language."

● SBasic

Structured Basic, uses Basic keywords in a Pascal-like environment.

● Super-Term

A modem program.

Inversing Video

WordStar is being shipped with the implementation of the inverse video option. When I contacted Kaypro last month, they told me they weren't shipping it with the inverse video activated. However, the computer industry moves swiftly and so does Kaypro. As a matter of fact, Non-Linear Systems has changed its name to Kaypro Corp.

The WordStar now being shipped with the Kaypro 10 is version 3.30. It doesn't work at all with my old dependable Random House thesaurus. When I tried to install the thesaurus on the 3.30 version of WordStar, the thesaurus aborted with a message that it could be installed only on WordStar versions 2.26 or 3.0.

I called Dictronic Publishing, Inc., at its customer service facility in Tijeras, New Mexico. I was informed that the thesaurus won't work with WordStar 3.30. In fact, all further development work on the thesaurus for WordStar has been taken over by MicroPro. Persons depending on the company's WordStar-integrated the-

File name	"C:Mufbar.004"
Original backup specification	"A:???????????"
ID comment	"Magic Wand September 29, 1983 9:03 pm"
Original file name	"A:Sample3.doc"
This is file #04 out of 13 in this backup.	
Original size of file	0008 hex.
This Mufbar file contains records:	
Starting with record number	0000hex
Through record number	0007 hex.

Fig. 1. An index of each program written to the floppy disk.

Address correspondence to Bob Hickey, PO Box 77022, Eagle River, AK 99577.

screen. MicroPlan, in the Kaypro 10 version, has a case of the "have-not-gots." For example, typing the command for Tables or Link generates the

MicroPlan response of "This add-on option is not available in your copy of MicroPlan."

Chang Labs sells add-on options to

this Basic program provided free with the Kaypro 10. I wonder if this will get to be a trendsetter in the world of packaged software—I hope other computer manufacturers avoid providing incomplete packages with their offerings.

The package that Kaypro is providing with the Kaypro 10 has another example of such a come-on in the WordStar package.

MicroPro says that version 3.30 is not compatible with earlier versions of WordStar's companion packages, such as MailMerge or SpellStar. So, if you want to upgrade your WordStar to 3.30, be advised that you must be prepared to pay the upgrade price of \$85 for each of the companion packages that you want to run with your new WordStar 3.30.

When and How Often?

When operating a hard disk, one often wonders what files to back up and how often to do it. Kaypro has at-

MicroPlan, in the Kaypro 10 version, has a case of the "have-not-gots."

tempted to provide a relatively painless way of (1) accessing a back-up process and (2) actually performing the backup.

On the Kaypro 10, this is accomplished by a menu selection called "Back Up Files." Its function is to run a program called MUFBAR-80. It is described by its manufacturer, Total Systems, as a "Multi-Floppy Backup and Restore System."

What it does is to copy your hard disk programs onto the floppy located in drive C of the Kaypro 10. And it does this at a small savings in disk space. It will also, using its Lookup program, give you a look at the indexing of each program written to the floppy disk (see Fig. 1).

When using this Lookup program, the screen tends to get cluttered. I would suggest that Total Systems provide for a clearing of the screen before each new file is listed. It is a good program and can backup some 255 files at a time.

WordStar Version

	3.00	3.30		
Location	Address	Value	Comment	
IVON	0284	0267	03	Inverse On
	0285	0268	1B	Kaypro 10 Code
	0286	0269	42	
	0287	026A	30	
IVOFF	028B	026E	03	Inverse Off
	028C	026F	1B	Kaypro 10 Code
	028D	0270	43	
	028F	0271	30	
ITITOG	0362	034F	FF	Come up with "insert": ON
	0386	036E	00	Justification: 00 Ragged Right FF Right Justify
	0389	0371	FF	Hyphen Help: ON
NONDOC	0392	0375	00	Nondocument Mode: ON
DECCHR	0393	037A	2E	Decimal Point Tab Character
DOTCHR	0395	037B	2E	Dot Command Character: 2E
HARDCR	03B4	03E1	7E	Hard Carriage Return:
PACFIL	03B9	03E8	AD	Display line of -'s w/inverse set on

Table 1.

Listing 1. A CBasic program that shows how to draw a box on the Kaypro's screen.

```
rem cbasic cursor positioning function for KAYPRO 10
def fncursor$(X,Y)
fncursor$=chr$(27)+chr$(61)+chr$(31+X)+chr$(31+Y)
return
fend

rem cbasic strings for KAYPRO 10 screen display
on$=chr$(27)+"B"+"0"      rem inverse on
off$=chr$(27)+"C"+"0"      rem inverse off

dimon$=chr$(27)+"B"+"1"    rem reduced intensity on
dimoff$=chr$(27)+"C"+"1"   rem reduced intensity off

blinkon$=chr$(27)+"B"+"2"  rem blinking on
blinkoff$=chr$(27)+"C"+"2" rem blinking off

underon$=chr$(27)+"B"+"3"  rem underline on
underoff$=chr$(27)+"C"+"3" rem underline off

curoon$=chr$(27)+"B"+"4"   rem cursor on
curoff$=chr$(27)+"C"+"4"  rem cursor off

linon$=chr$(27)+"B"+"7"    rem status line on
linoff$=chr$(27)+"C"+"7"  rem status line off

rem cbasic string to clear the screen for the KAYPRO 10
cls$=chr$(27)+"C"+"0"+chr$(27)+"C"+"1"+"1"
chr$(27)+"C"+"2"+chr$(27)+"C"+"3"+"1"
chr$(27)+"B"+"4"+chr$(27)+"C"+"7"+chr$(26)

rem cbasic routines to draw lines and rectangles on KAYPRO 10
rem adapted from sbasic routines provided by Kaypro on the KAYPRO 10
def fnposition$(VERT,HORZ)
fnposition$=chr$(27)+"="+chr$(VERT+31)+chr$(HORZ+31)
return
fend
```


saurus who may be thinking of upgrading to WordStar 3.30 should bear in mind that Dictronics Publishing has no plans to support that configuration.

WordStar 3.30 on the Kaypro 10 is different from version 3.0 provided on the Kaypro 4. It takes up 20K of space on the Kaypro 10, compared with the 16K of version 3.0. Part of the change is an overlay of a sign-on message. The sign-on is the only poor-quality thing about this WordStar version.

While we are on the subject of WordStar, version 3.30 is not supported by the old customization notes for version 3.0. But, for you inveterate hackers out there, I have found a few starting points (see Table 1).

When you're done with the changes in DDT, you must type SAVE 70 WS.COM for WordStar 3.30. I mentioned DDT because MicroPro has provided Kaypro with an installation program called WINSTALL.COM. This program, unlike the INSTALL.COM program provided with Wordstar 3.0, provides a menu-restricted customization of WordStar 3.30. For example, WINSTALL.COM allows the WordStar owner to change preselected items by toggling them on and off.

List of WINSTALL.COM Options

- A. Initial help level
- B. Decimal point character
- C. Nondocument mode
- D. Initial directory display
- E. Initial insertion toggle
- F. Justification toggle
- G. Hyphen help toggle
- H. Hyphen help toggle
- I. Top page margin
- J. Bottom page margin
- K. Left margin
- L. Right margin
- M. Number lines/page
- N. Page offset
- O. Form feeds
- P. Data field separator
- Q. Variable name symbol
- R. Default disk drive

A Cheer for Friendly Software

For the nonprogrammer, MicroPro is to be complimented for choosing the route it has.

Kaypro has for too long been plagued by unfriendly software. Aside from the friendliness of Perfect Filer, with its menu-driven ease of use, the Perfect package of software served to inhibit many first-time computer owners.

At times, I got the impression that the not-so-perfect software was being developed using the Kaypro owners as a large beta test unit.

I remember one sequence of events with Perfect Calc. The folks at Perfect Software, bless their hearts, sent our Kaypro user's group a set of upgrade disks to correct some bugs in the program. At the next monthly meeting, we got a notice from Kaypro to the effect that it wouldn't support software updates that didn't come from them.

Then, at the next monthly meeting, we were told that the dealers in town had received updates of Perfect Software from Kaypro and members could stop by and get their programs cleaned up.

For the nonprogrammer,
MicroPro is to be
complimented for
choosing the route
it has.
Kaypro has for
too long
been plagued
by unfriendly software.

Kaypro now has put together a package of software for the Kaypro 10 that should make service easier. Consider what it has: WordStar, even in its new face of version 3.30, is a reliable word processor that wins new computer users over each time it boots up on a home computer.

Unlike Perfect Writer, new users are not left wondering how to make it work. Kaypro pulled off another coup when it added The Word+ to the family of software. I like the fact that it will suggest possible replacements for misspelled words. For example, I wrote the non-word: "oknly" in this text. When I used the Lookup option in The Word +, it suggested:

0 only

I typed the "0," and "only" was substituted for my error. For the misspelled word "assett," the Lookup option provided seven possible words I may have meant to use:

0 assent	
1 assert	4 asset
2 asses	5 assets
3 assess	6 assist

After typing "C" for correct, I merely tapped the 4 key and the correct spelling of "asset" was entered in my text as a substitute for my spelling error. You certainly develop confidence in a spelling checker when this happens.

There is one peculiarity with running The Word+ from within WordStar with the run option. If you specify the filename to be checked as a part of the command line calling The Word+, then The Word+ won't give you the opportunity to specify any special dictionary to be used in conjunction with the main dictionary.

Of course, the purpose of having a special dictionary is to tell The Word+ which words you use frequently in your documents. By having The Word+ enter words you use frequently, but which it doesn't recognize from its on-line dictionary, you can still provide the program with a personalized list of words to be checked.

But if the filename is included as a part of The Word+'s command line from within WordStar, you won't even be given the chance to have your specials dictionary list checked by WordStar.

So, what you should do if you want to check your spelling using an added specials file is to specify only The Word+'s name when WordStar asks for the name of the file to run. This way, The Word+ will ask you if you want a special dictionary to be checked.

Plan on It

MicroPlan is basically an upgrade from Chang Lab's ProfitPlan. Chang Labs has designed MicroPlan for medium-sized businesses. These are defined as those doing between five and 50 million dollars a year in business. It is not designed as a spreadsheet but as a financial planning tool for middle business managers.

MicroPlan, as implemented on the Kaypro 10, has its menu options shown in a column of inverse video. Its cursor position is also lighted with inverse video for the width of the column.

MicroPlan features an extensive on-line help file. Merely type 7 and then the number of the command for which an explanation is desired. After presenting the help message at the bottom of the screen, MicroPlan prompts you with a line displayed and underlined at the top of the screen:

Press any cursor key to recover your display.

Of course, if you want, you can type the command 115 to redisplay the

Of course, finding a floppy to handle such a large back up might take some looking around. Through its restoration program, MUFBAR-80 will put the saved programs back onto the hard disk from floppies. Why back up your files? Just good common sense!

I haven't experienced any troubles with my Kaypro 10's hard disk, but I've had it for only two months now. Where my writing is concerned, I tend to be conservative. I back up frequently, so I like the idea that Kaypro is consumer-oriented enough to pro-

Kaypro has taken
a great step
forward...

vide this type of quality back-up program as a part of its software package.

I always back up my programs and what I create in order to insure against machine failures. The MUFBAR-80 program assumes that you'll want to use its services to make what are called "archive" copies of what you have on the hard disk.

Archive copies aren't designed to be run in their archived condition. In the first place, they are compacted to preserve space on the floppy. In the second place, they have been assigned a MUFBAR name. This name now consists of the word MUFBAR plus the hex extension showing the number of the file in hexadecimal notation.

No More Computerease

The most visible effort that Kaypro is making to help the new purchaser is its master menu. The master menu is a program developed by Kaypro in SBasic. With this, the new computer owner doesn't have to go through the shakedown of learning "computerease" in order to make the computer do what he wants it to do.

There is a blending of menus in each of the user areas that provides easy access to the word processing and other programs furnished with the machine.

Kaypro has also provided the SBasic source codes for the menus. This should go a long way in helping people learn to program in SBasic. Too bad Kaypro didn't do the same thing

```
def fnpixon$(VERT1,HORZ1)
fnpixon$=chr$(27)+"*"+chr$(VERT1+31)+chr$(HORZ1+31)
return
fend

def fnpixonoff$(VERT1,HORZ1)
fnpixonoff$=chr$(27)+" "+chr$(VERT1+31)+chr$(HORZ1+31)
return
fend

def fndrawline$(TOPOINT,LEFTPOINT,LOWPOINT,RIGHTPOINT)
fndrawline$=chr$(27)+"L"+chr$(TOPOINT+31)+chr$(LEFTPOINT+31)+"1"
chr$(LOWPOINT+31)+chr$(RIGHTPOINT+31)

return
fend

def fnset.on$(att)
fnset.on$=chr$(27)+"B"+chr$(att)
return
fend

def fnset.off$(att)
fnset.off$=chr$(27)+"C"+chr$(att)
return
fend

def fnrectangle$(Y,X,HEIGHT,W)
print fndrawline$(Y, X, (Y + HEIGHT), X);
print fndrawline$(Y, (X + W), (Y + HEIGHT), (X + W))
print fndrawline$(Y, X, Y, (X + W))
print fndrawline$((Y + HEIGHT), X, (Y + HEIGHT), (X + W))

return
fend

Y = 8
X = 40
HEIGHT = 36
W=80

rem program starts here

print cls$
print fnrectangle$(Y, X, HEIGHT, W);
print on$;
print fncursor$(4,38);
print blinkon$;"A";
print blinkoff$;" BOX"
print off$;underon$;
print fncursor$(6,34);
print "By Bob Hickey";underoff$
print fncursor$(8,31);
print "Eagle River, Alaska"
print fncursor$(25,1);
print lineon$;on$;curoff$; " PRESS X AND return TO ";
INPUT "TERMINATE PROGRAM" "X";
print cls$
end
```

for CBasic. Kaypro includes several SBasic programs with Kaypro 10. I have included a CBasic program that shows how some of the Kaypro 10 codes can be used in a program to draw a box on the screen (Listing 1).

This is a useful program that lets you put headings at the sign-on of a program. It can also be used to put questions in for parent-developed flashcards to help the kids with their homework. After the student responds to the question, just clear the screen and show the answer in the answer

box. Or you could leave the box on the screen and put in a running score tabulation.

A Giant Step for...

Finally, Kaypro has taken a great step forward with the introduction of this set of software on the Kaypro 10.

Kaypro should be advised to include a spreadsheet with this unit. MicroPlan as a financial planning tool is fine for its purpose. But, it isn't envisioned as a replacement for a solid spreadsheet program. ■

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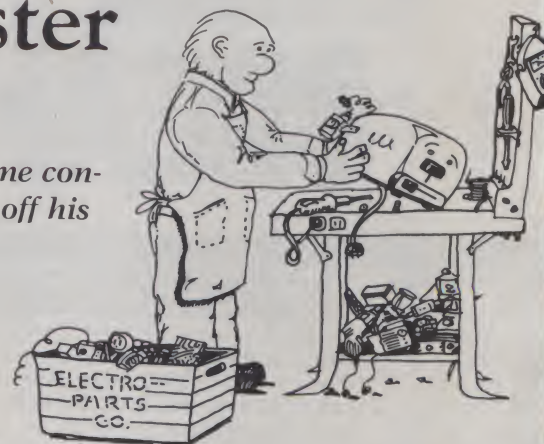
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The Intelligent Toaster

This month, Mark Robillard concludes his series on home control system architecture. Next month, the author kicks off his new monthly column "Techniques."

By Mark Robillard



Last month I began a description of the design of a general-purpose I/O card that has the ability to communicate with an operator by using a combination of tone signals and voice messages. The name Command Communicator seemed appropriate at the time.

This time I'll present the design of a set of subroutines to support the board's functions.

Speaking of functions, let's review the basic architecture of the Command Communicator board. Fig. 1 shows the various functional circuits that are included on this card.

As can be seen in Fig. 1, an interface capable of receiving touch tone codes from a remote keypad is provided. Through this, various commands may be loaded into a system. The nice thing about using tones is that only a single audio cable is necessary to transmit the signal. An interface that allows connection of a standard telephone line for those really remote keypads may be added.

Moving around Fig. 1, you can see the incorporation of a voice synthesizer, which makes operator prompting for input and annunciation

of error or alarm messages both possible and useful. The synthesizer used here is programmed using codes for sounds.

Complementing the speech output capability is a circuit that allows simple sentence structure voice recognition. Although this type of recognizer is less accurate than others, it does allow for extremely inexpensive dialog between man and machine. Try it! You'll be surprised at the results.

Rounding out a review of the hardware, we wander back to the microprocessor, which coordinates all of these functions. (If you'd like a better understanding of the 8748, a complete reprint of the tutorial on that microprocessor appears in chapter 1 of my

book *Microprocessor Based Robotics*, from Howard W. Sams & Co., Inc.)

To help in implementing an interactive command system, I wrote several firmware routines that can be programmed into the 8748. These programs allow you to write higher-level applications code, which calls these routines when I/O processing is necessary, and take most of the headaches out of your work.

Let's go over the operation of each command to familiarize you with the capability of the board.

Command Operations

●Get Tone Code—This routine constantly polls the touch tone input interface awaiting a valid key code.

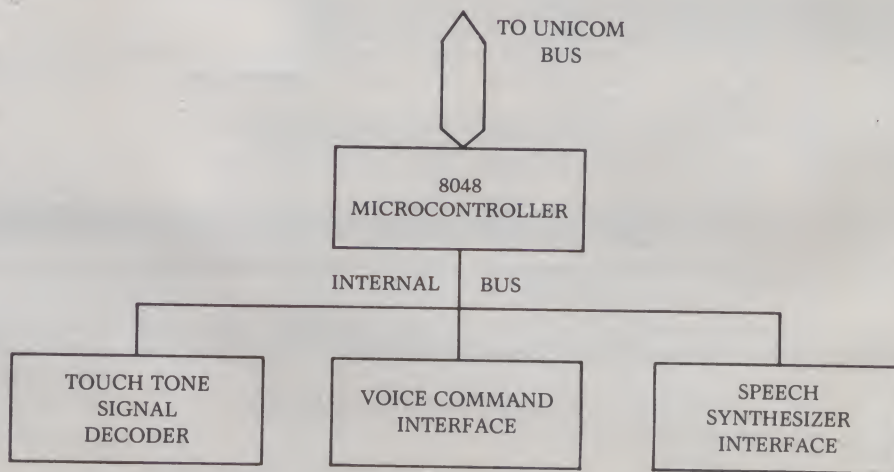


Fig. 1. Block diagram of Command Communicator.

Mark Robillard (MJR Digital, PO Box 630, Townsend, MA 01469) has authored a pair of books on computer-controlled tutorials and applications: *Microprocessor Based Robotics* and *Hero 1: Advanced Programming and Interfacing* (both published by Howard W. Sams & Co., Inc.).

When a key tone is received, this routine returns with the hex equivalent of the key in the data register (A).

●**Get Data Entry**—This routine acts as a higher-level code system. Up to four tone entries may be stored as a packed two-byte entity. It returns as soon as the # key tone is detected. The two-byte packed code array is stored in registers R6 and R7.

●**Speak Word**—With this routine, it's possible to have the board speak the word of your choice. Each word is stored in a vocabulary elsewhere in ROM.

●**Speak Phrase**—This routine allows multiple word phrases to be spoken from the vocabulary.

●**Listen**—As the word implies, this routine polls the voice recognizer for sound input. It characterizes the input as to how many words or utterances were spoken and to the length, in time, of each.

●**Get I/O**—This routine allows the command processor (8748) to receive command codes via the parallel UNICOM interface.

●**Put I/O**—Conversely, this routine places control bytes on the UNICOM bus.

Well, there you have it. Later on, I'll provide a simple application using many of these routines. Right now, it's important that we delve deep into the actual operation and coding of each routine.

Tone Input Routines

Of the two routines provided for tone code input, it will be smarter to go over the Get Tone Code first. During this routine, as I said earlier, the 8748 awaits a valid tone code entry. What exactly is a valid entry?

If you chose, last month, to opt for the SSI 201 decoder chip, then this means that the Data Available signal connected to the T0 microprocessor input will pulse high. At this time, the hex code equivalent of the button that was pushed appears for input at port lines P24-P27.

Basically, the function of this routine is to constantly poll the T0 input awaiting a logic 1 level. To pull in port 2 data, strip off the lower four bits and swap nibbles.

Did that go past you too quickly? Let me explain in English.

The Get Tone Code routine's purpose in life is to retrieve a digital code that corresponds to the tone representing a pushed tone button. There are 16 possible buttons on a fully functional touch tone pad.

Therefore, the code representing each button can have a value somewhere between 0 and F (hexadecimal).

When the Data Available output of the tone decoder goes high, a valid hex tone code is available at its output. These four lines are connected to the upper four bits of the 8748's I/O port #2.

The routine returns with a code for a valid tone entry placed in the accumulator (A). Simply reading port 2 not only secures the four-bit tone code, it also reads the status of the external I/O request line and the undefined states of port lines 20, 21 and 22.

The idea is to present the application program with an output that is

Right now...
we delve deep
into the actual
operation and coding.

useful and requires no external processing. Therefore, a clear eight-bit byte with the four-bit code representing the binary equivalent of 0 to 15 would be nice.

In order to do this, it's necessary to do a swap nibble command, which essentially moves the upper four bits down to occupy the lower. It also moves the unwanted lower bits to the newly vacated upper four. To get rid of them, simply zero them out by performing a logical And on the byte with an immediate value of 0F. Fig. 2 depicts the program flow of this routine.

The actual code involved is shown in Listing 1. Don't worry about where it fits in yet; a complete listing of all routines properly placed in memory is available (see end of article).

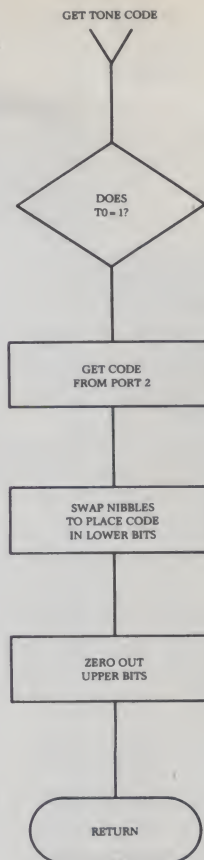


Fig. 2. Logic flow of Get Tone Code routine.

Getting Into a Routine

That's all there is to it. You'll find this routine in Listing 1 useful when asking for command input. However, I have provided a higher-level routine for the entry of data. This one, called Get Data Entry, frees the application program from the drudgery of continuously calling Get Tone Code and storing the results. It allows the entry of up to four consecutive tone codes terminated by the reception of the # button code.

What is meant by "up to"? Well, consider the need to enter only two digits of data. As long as the # code is received, the routine will store only the amount of data presented. In this way, the code has been designed to

GCODE	JNT0	,GCODE ;Test T0 for logic 1, if none, loop
	IN A	,P2 ;if a logic 1 is found get code
	SWAP A	;put code into lower nibble
	ANL A	,#0F ;zero out upper four bits
	RET	;return with code in A

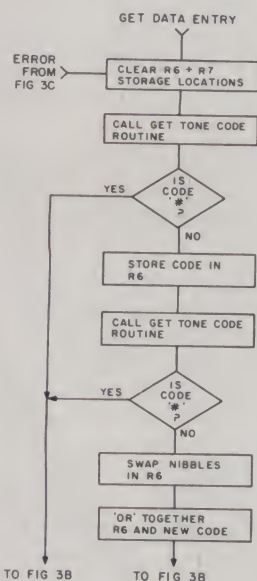
Listing 1. Code used in program shown in Fig. 2.

eliminate the so-called "leading zero problem" when an application is looking for a number, like the temperature, that could conceivably contain three digits. If you intend to enter 49, it gets cumbersome to push 049. This routine automatically inserts the zeros if the number is less than four digits long.

What happens if you enter more than four digits before the delimiter? A properly designed input routine should allow for error; the way you negate errors here is to fully enter the correct number.

The fifth entry will start the whole process over with a clean slate looking for the full four digits.

Let's go over the actual design implementation of the routine by following the logic flow outlined in Fig. 3. First off, both code register bytes (R6 and R7) are cleared. These are the locations where the four tone codes will be stored.



In order to provide leading zero entry, the locations of each tone code received will have to be manipulated constantly. The first entry will reside in the lower nibble of R6, indicating a "units" digit location. When the second entry is detected, the first code will be shifted to become the "tens" digit, and the newer code replaces the older in the "units" position.

Throughout the entry process, the code received is checked to make sure it isn't a #. When one is detected, the whole process is completed and the

routine returns to the application program with whatever data entered safely tucked away in R6 and R7.

Voice Output Routines

That does it for tone entry routines. I've found it almost impossible to program a data entry application without providing some feedback to the operator regarding status; it's also nearly impossible simply to echo the data entered. This is where the next two routines come in.

In applications where power is critical, voice output serves well as a feedback medium. Here at home, it lends itself well to incorporation into standard intercom housings because all that's needed is a speaker.

The first routine for voice output vocalizes the word of your choice. Each word is comprised of a string of bytes, each representing a discrete sound called a phoneme. If you opted for the GI synthesizer last month, then the sound code represents an allophone. The length of this string depends on the word coded.

The routine itself expects that a word address in the hex range of 01 to FE will be placed in register R7 of the 8748 prior to its being called. From there, the word number becomes an index into a larger table, called a vocabulary. In this table are several dozen or hundred words comprised of

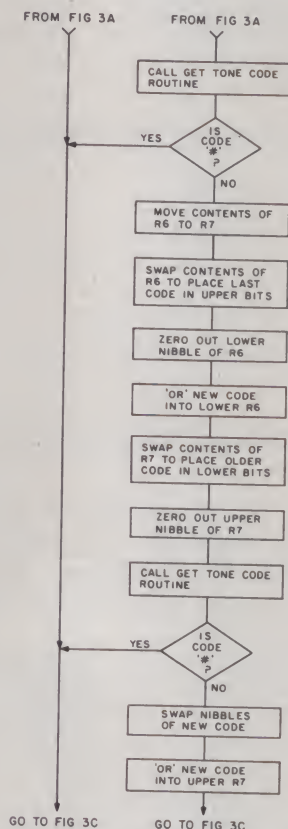
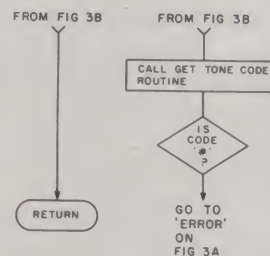



Fig. 3. Logic flow of Get Data Entry routine.



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sound codes. At the end of each word is the code byte 00. This value is not a valid sound code and therefore may be used to flag the end of the chain.

Fig. 4 covers the logical flow of the routine. It shows that the word number index is obtained initially from R7. This number is then loaded into a counter; the routine then checks to see if it is 00. If it's zero, then the first word in the vocabulary is pulled, sound code byte by byte, and sent to the speech synthesizer circuit. Before each byte is sounded, however, it is checked for zeros. This interrogation is to determine if the end of the word has come.

Any other word number addresses

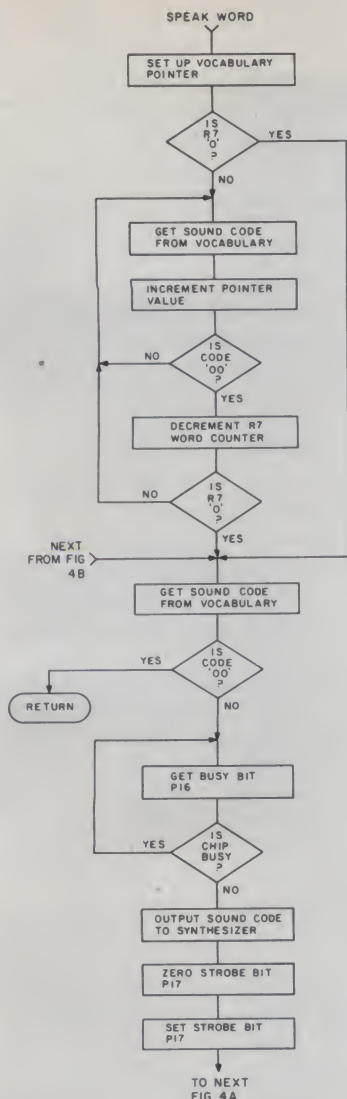


Fig. 4. Logic flow of Speak Word routine.

are used, as I mentioned, as counter values. The counter is decremented each time the routine comes across a 00 endmarker. In this way, word #3 will reside as the string directly following the third end marker (0, 1, 2, 3). Each time the routine is run, the pointer is reset to the beginning of the vocabulary table.

In shipping a sound code to the synthesizer, first check to see if it's ready to receive a byte. This is done by reading the status of port line P16. To do this, the entire eight-bit port 1 must be input into register A. All other non-essential bits are stripped off by the use of the logical And; then a determination can be made if the bit is a logic 1 or 0. A logic 0 indicates the desire or the permission to receive data.

Transmission occurs by the 8748 outputting the six-bit value on the lower six port 1 lines, then by toggling the strobe line (P17) to the chip. To toggle means to fall to logic 0 and then back to logic 1.

All of the programming associated with sending a word to the synthesizer is done. But wait! I've gone a little bit further and included another higher-level macro command.

The Speak Phrase Routine allows you to vocalize a complete sentence. Basically, it's a routine that gets word numbers and calls the Speak Word sub. The way it does this is by again looking at a table. The entries into this

Here's where the fun begins. It's time to teach the board to listen to its master's voice.

table are word numbers. The table address is predetermined, as in the case of the word vocabulary. Register 7 contains, for this sub, the phrase number that you want to speak.

Fig. 5 outlines the flow of the routine. Most of the logic remains the same as the Speak Word routine, except that an end code of FF marks the time to stop speaking.

As you can see, each entry in the phrase table is a word number. The routine continuously stuffs word numbers into R7 and calls the Speak Word routine. When a word number of FF appears, the routine stops.

Voice Input Routines

Here's where the fun begins.

By now you should be all "talked out." It's time to teach the board to listen to its master's voice. Believe it or not, it's even easier than talking!

As you recall from last month's hardware description, the voice recognizer incorporated onto the board is basically an amplifier and a one-shot multivibrator. As long as sound is present, the output of the one shot remains low. The time constant it is set to will detect dropouts of sound as small as 100 milliseconds in duration. This

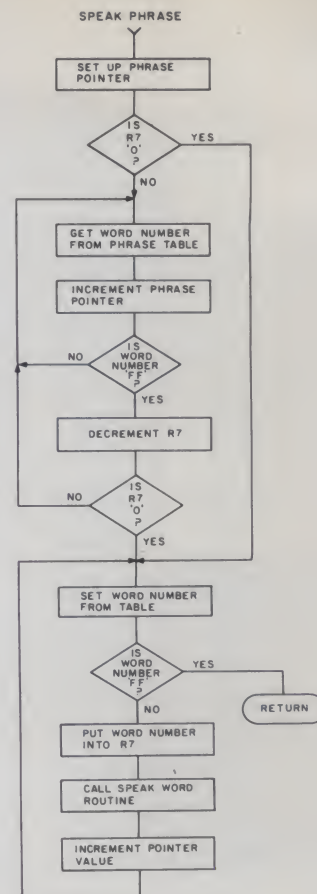


Fig. 5. Logic flow of Speak Phrase routine.

roughly equates to the short pause most people insert between words.

Therefore, our circuit can mark the beginning (output goes low), duration (output remains low) and end (output returns high) of a word. Building on this logic, we should be able to accumulate a lot of data on an entire sentence if we arbitrarily set a no-sound pause of two to three seconds as a sentence end marker.

The routine described in flow diagram Fig. 6 will poll the output of the recognizer. It does this easily because this signal is applied to the testable input T1 of the microcomputer. You may recall from our discussions about the 8748 that there is a Jump if T1 = 1 instruction. The beauty of this is that in two bytes of code, our routine is constantly polling the recognizer awaiting input.

When a logic zero is discovered, a timer is started. This timer will continue incrementing its value as long as T1 is low. As soon as it suddenly sparks high (inter-word gap), the timer will be stopped and its value recorded in an internal register location.

This inter-word gap is now timed to determine if it is signaling the end of

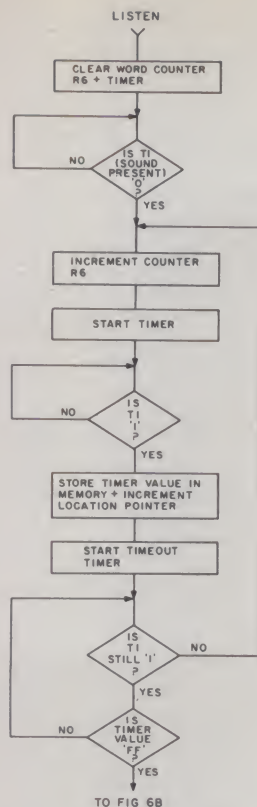
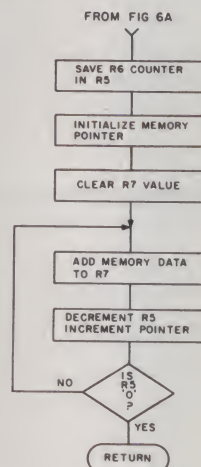


Fig. 6. Logic flow of Listen routine.

the sentence. If not, a "number of words present" counter is incremented and the timing of the next word duration commences. This goes on until an end-of-sentence gap is detected.

When the end comes, the routine has accumulated the number of words accepted in register 6 and the total of the word durations taken in register 7. There two pieces of data should provide a unique two-byte "template"



that can be used later to recognize the same utterance.

The routine provided here will receive only a spoken utterance and classify it according to what I just described. Realize, however, that it is next to impossible to utter a phrase the exact same way twice. Therefore, when writing a recognition algorithm, do not check to see if the template bytes match directly. You should instead look for the closest match. This way, you'll provide some leeway in the process.

I/O Processing

Last but not least are the I/O routines. These allow the board to communicate with other pieces of equipment via the parallel UNICOM bus. Get and Put are the universal calls for I/O. Both routines are flowcharted in Fig. 7.

The Get I/O routine is actually an interrupt service routine. Last month's schematic diagram showed that the UNICOM bus "Call" line from the master controller (outside piece of equipment) is connected to the INT interrupt line of the micro. Yanking this signal low will cause the 8748 to im-

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mediately propel itself to fetch its next instruction from location 003. There, a jump that catapults it to the Get I/O routine is placed.

When it gets there, the accept/request flag is set to a busy state; then it picks up the data left at its door stop (Bus port) by the calling party prior to the call signal pull. After getting the data settled in R7, the routine courteously returns the request line to its active state, signaling to the world that another data byte may be accepted. After this, it returns from whence it was summoned.

Put I/O is similar but different. Yes, it goes through the accept/request toggling, except instead of depositing a byte in R7, it removes it from there and ships it to the outside world.

For a Complete Listing...

For interested readers, I'll provide a complete assembly language listing of the routines. This, along with some typical applications calls, will be provided free of charge. To obtain a copy, send a stamped, self-addressed, business-size envelope to MJR DIGITAL, PO Box 630 (LST), Townsend, MA 01469. ■



Fig. 7. Logic flow of I/O routine.

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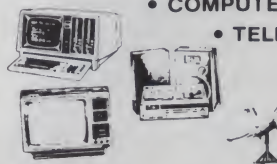
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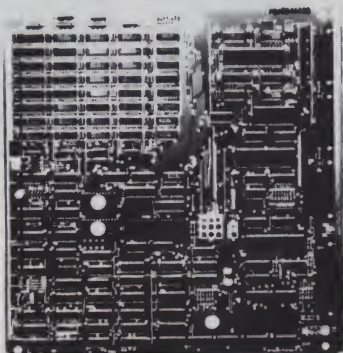
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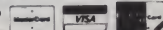
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Speculations on SpectraVideo

Will the SpectraVideo 318 challenge the Commodore-64 on the low-end front? It just might. The 318 isn't perfect, but its superb features make it a strong candidate.

By Sharon Zardetto Aker



The SpectraVideo 318 is not perfect, but it is absolutely terrific. Despite the major drawback of an uncomfortable keyboard and the frustration of poor documentation, I'm tempted to add it to my personal computer collection.

The Heart of the Matter

The SV 318 is the heart of a computer system that its manufacturer promises "you'll not grow out of." The 318 is, well—extraordinary might

be the right word.

Its CPU is a Z-80; it has 32K ROM expandable to 96K and 32K RAM expandable to 144K. Its internal clock runs at a fast 3.6 MHz.

The extraordinary feature, however, is the built-in Extended Microsoft Basic; you may find that part of this review, while praising the capabilities of the SpectraVideo, is also an essay on the joys of that language.

The computer's graphics capabilities are outstanding. Would you be-

lieve 32 sprites? There is also three-channel sound with programmable ADSR envelope, and it's no slouch when it comes to mathematical operations and string manipulations, either.

What else could you ask for? Well, how about CP/M compatibility, programmable function keys, built-in

Address correspondence to Sharon Zardetto Aker, 20 Courtland Drive, Sussex, NJ 07461.

joystick, cartridge slot, an adapter for Coleco game cartridges, TV and monitor compatibility, and the newly announced MSX agreement that makes the system compatible with products from 14 Japanese computer manufacturers and with other firms as they join the MSX standard.

The Keyboard

Now the bad news. I have nothing against chiclet-style keyboards, but this is an uncomfortable one to work with. If the keys are struck squarely in the middle, there is no problem: there is an audible pop and a decent tactile feedback. However, the keys rock a little on a central point, and pressing one off-center will not register with the computer (most of the time). It's particularly annoying to find that your shifted characters aren't shifted after all because you didn't hit the key just right.

The alphanumeric keys are arranged in the standard QWERTY format. The remainder of the 66 keys are the usual escape, delete, insert, clear and control keys, as well as five function keys, two graphics keys that let you access the symbols printed beneath the other keys, and a mystery key, labeled Select, that is not referred to in any documentation.

The built-in joystick is awkward to work with as a cursor controller. However, the stick is removable, and you're left with a circular cursor-control pad with fingerprint indentations at four points for cursor direction. After an initial period of getting used to it, I found it preferable to the usual cursor-control keys. Diagonal cursor movement is also available with this pad; unfortunately, the cursor occasionally moves at an angle instead of horizontally, and I found I had to compensate repeatedly for this tendency.

There is a caps lock key, with an indicator light beneath it since the key itself doesn't lock down; there is also a power-on indicator light.

The keyboard is nearly my only complaint about the SpectraVideo.

A Look at the Display

The screen is 40 characters by 24 lines. The 40 character figure is a maximum; it can be reset by a width command. Oddly enough, the default setting, at least on the review model, is 39.

Except during hi-res mode, or in the absence of a clear-screen com-

mand, the values of the function keys are displayed across the bottom of the screen. Each time the shift key is pressed, the values of the shifted function keys take their place. I found their presence on the screen annoying and the shift changes distracting. Default identifications would have been better placed right on the keyboard, especially considering the KeyList command that shows the current value of the keys.

The function keys are what you want function keys to be. You can assign a value to them, "Screen," or "Draw," for instance, and each time you press the key, that word will appear on the screen. This is in contrast to some function keys—those on the Commodore-64 come to mind—which are strictly for use during the running of the program, (e.g., "Press F1 to continue"). The five keys (ten available functions using shift) are preset to

The keyboard is
nearly my only
complaint about
the SpectraVideo.

such common commands as Goto, CLoad, List and Run, which incorporates a clear-screen command. The appearance of the text, white on blue at start-up, and the quality of the colors are reasonable on the television screen and very good on the monitor.

Graphics

There are 16 colors available on the SpectraVideo. You will have to keep looking up their code numbers in the manual because there are no color names on the keyboard. Hi-res is 256 × 192 pixels; lo-res mode addresses a square of four pixels at a time.

There is a 52-character graphics set that appears rather mundane compared to some of this computer's other capabilities. The set is the usual circles, squares, boxes and portions thereof, and symbols for suits in a deck of cards. Two symbols appear under each of the letter keys and are accessed by pressing the left or right graphics key at the bottom of the keyboard. So much for the mundane.

There is a screen command to choose hi- or lo-res. The first graphics command introduced, PSet, fills in a point in a specified color. In lo-res, the point is a quarter of a character space; in hi-res, it is a pixel. Preset erases the point.

The line command is just what you'd expect, but it can be appended with a "B" in order to draw a box with the corners described by the line coordinates. Addition of an "F" will fill the box with color as it's drawn.

It's hard to explain the graphics capabilities of the 318 without turning out a tutorial on Extended Micro-soft, but here are some further highlights:

Circle, defined by center coordinates and radius length, has options for partial circles and for ellipses of various height/length ratios. Color sets foreground (character), background, and border colors. Locate places the cursor by line and column number.

With Draw, you can indicate horizontal, vertical or diagonal direction with single-letter commands accompanied by a number for the desired line length. Paint is used with coordinates that are inside the area you want filled with a specified color. (Fill only works with Box.)

All of the graphics commands work in both hi- and lo-res with, of course, very different-looking results. As a matter of fact, you can even use the print command on a lo-res screen and get enlarged characters.

Get This

Of all the graphics commands available, I found the get command to be the most impressive. (This is not a keyboard-reading command; IN-KEY\$ is used for that.) With the get command, coordinates are given that define a box on the screen. The contents of that box are assigned to a string variable, and that string can then be put at another location. This means a picture can be easily copied from one section of the screen to another. There are options with the put command that give various combinations of the get string and the background: these can be additive or exclusive, dependent upon the use of And, Or and XOR, and can be standard or reversed images with Pset and Preset.

Designing the 32(!) available sprites is a little awkward. Binary codes describing the shape of the sprite need

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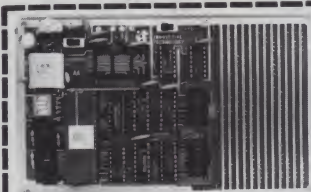
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to be put into a sprite string before it can be put onto the screen. Sprites can be either 8×8 or 16×16 pixels. Sprite collisions can be detected and acted upon with the on sprite command.

A Few Nasty Words

Before explaining some of the other features of the SpectraVideo, a few words about its documentation—a few nasty words. It is clearly written, if you can ignore the typos—some of which change the meaning of the instructions entirely.

It is directed at the computer novice, and does a good job of introducing various programming concepts. However, it stops at the novice level and will leave even the beginner wondering and begging for more information. There is an instructional tape available that goes a little further but not nearly far enough. There is also a Quick Reference Guide that lists all the commands available in Extended Microsoft; it explains them briefly and cryptically: "WAIT... suspends program execution read input at port until (input bit XOR select And with mask) returns nonzero." The only reason I understood that is

because I have another computer with that command available. In fact, the entire guide seems designed for someone already familiar with the commands on another system who only needs to know the slight differences that might apply to the SpectraVideo.

There just isn't enough information available to get at a lot of the 318's

Coordination of sound
and graphics is an
easy prospect.

features. There is, for instance, a Vpeek command to check an address in the video memory, but without a memory map you're not going to be able to Vpeek or Vpoke. And, while the authors did a commendable job of presenting what information there is, the proofreaders ought to have their eyes checked.

The Sound of SpectraVideo

There is eight-octave, three-channel

sound available, and the basic sound commands are simple enough to use. Play is followed by the letter name of the note in a string, with various indicators for octaves, rests, durations and so on. The ADSR is programmable, but you'll have a hard time doing it, since the techniques are not mentioned in the manual and the reference guide is less than helpful.

The computer always reads ahead on sound commands, which means the music will be playing while the computer gets on with the rest of the program. This makes coordination of graphics and sound an easy prospect.

The quality of the sound through a television speaker is fine, but with a monitor, the notes are all but drowned out by an unpleasant hum. I have no doubt that this was due to the connections I was using. SpectraVideo provides only the television connection cable, with rf modulator, with the computer; they do have a monitor cable available.

Numbers and Strings

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this computer, it certainly does its share of mathematical manipulations. Aside from functions that you expect, such items as integer division, and double and triple precision numbers are available.

There are also some rather esoteric operations such as MOD (integer modulus), EQV (bitwise equivalence) and IMP (bitwise implication). They may well remain a mystery to many users; they aren't mentioned in the manual, and the reference guide gives as explanation only the parenthetical phrases that I just used.

There are prefixes to indicate binary, hex and octal constants. Variables are, rather surprisingly, limited to two characters.

The usual string functions are available, as well as the less common SPACE\$ and INSTR (instring), and HEX\$ and OCT\$ to convert those numbers to strings.

A Plethora of Peripherals

As mentioned before, the SV 318 is the center of a complete—a very complete—system. Among the peripherals available or planned: cassette recorder, disk drive, printer, mon-

itor, joysticks, graphics tablet and a "system expander" console that allows the 318 to interface with as many as seven devices at a time. There are also expansion cards for additional RAM, Centronics and parallel interfaces, dual disk drive controller, modem and an 80-column display card.

Only the recorder was available for

SpectraVideo has its own line of business, personal, educational and game software.

review, and it is discussed below. The other two items that will be of most immediate interest are the disk drive and the printer.

The disk drive uses standard 5¼-inch single-sided double-density disks that store 250K unformatted (about 164K formatted). Although a company spokesman said the \$325 drive unit connects directly to the computer, its specs state that "all dc

power is supplied by the drive controller," which is listed elsewhere as \$150 by itself.

The printer is a Gorilla Banana in all but name, which means it is a fine bidirectional impact dot matrix printer with tractor feed. It has a rather slow printing speed of 50 cps, and its lack of true descenders may make it inappropriate for more serious applications.

The Recorder

The recorder was the only peripheral available for review. It has some special features that make it better for information storage than the usual cassette system.

First of all, it plugs directly into, and draws its power from, the computer. Once the recorder has been turned on (there is an LED indicator light), it can be controlled from the computer, either by direct command or in a program. CLoad or CSave switches it on, and it turns off when the operation is completed.

It also has a built-in microphone and two-channel sound. This means, according to advertisements, that you can have voice-supported programs.

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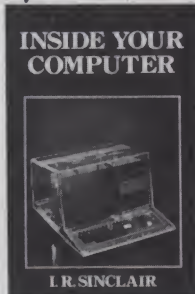
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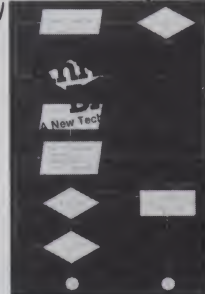
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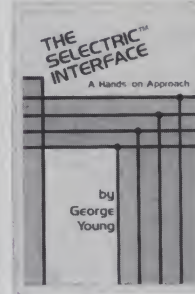
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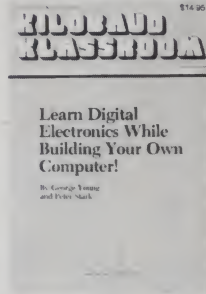
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Apparently the motor on/off commands will control that portion of the program—there's no hint in any of the documentation as to exactly how to go about such a project. It saves and loads at a fast (for tape) 1800 bits per second.

Some of the less praiseworthy features of the recorder are its documentation and the use of geometric symbols on its keys for record, play and so on. As a program loads, you can hear it from the monitor speaker. Have you ever heard a computer program? "Unpleasant screech" is putting it politely.

Third-Party Software Support?

SpectraVideo has its own line of software in business, personal, educational and game categories. The two games I tried are not unique in concept but certainly make good use of the graphics and sound capabilities. Documentation is horrendous, as usual, but the programs themselves are a cut above the usual in-house developments for a new computer system.

A spokesman said that a lot of third-party support is expected, espe-

cially with the advent of the MSX standard.

Three software companies I spoke with all had the same reaction—they're "keeping an eye on it." So...

Who will buy?

The question of software support leads inevitably to the question of how big a seller the computer is going to be. Third-party software is always available for big sellers; big sellers are those that have a lot of software available.

This chicken-or-egg problem applies to all new computers, of course, but SpectraVideo is probably going to find its chief competitor is the Commodore-64. Their capabilities, on the surface, are comparable; Commodore wins in the sound department, SpectraVideo in the graphics.

As far as I'm concerned, the SV 318 wins hands down in the overall comparison because of its ease of use with Extended Basic.

Most buyers, however, won't realize that programming Commodore graphics and sound is confusing at best. Also, Commodore has a year's jump on advertising, sales and software development that SpectraVideo

is going to find hard to beat. Although the SV 318 at \$299 is an incredible buy, the C-64 is currently priced at least 50 dollars lower.

On the other hand, SpectraVideo's MSX standard agreement is going to give it an edge with more knowledgeable consumers. The promise of compatibility with equipment from 14 other manufacturers is nothing to sneeze at. SpectraVideo's impressive line-up of its own peripherals is going to be a big selling point.

I'm not going to presume to make a prediction about this system, but I hope that it becomes a big hit: it deserves to be.

Summary

The keyboard is the SV 318's only weak point. It is a computer with wonderful capabilities that will be easy to access with the built-in Extended Basic, once you get past the hurdle of sketchy documentation.

The lack of extensive documentation is one that can be easily remedied. The SV 318 offers a lot of power for the price, and it deserves serious consideration from the personal computer consumer. ■

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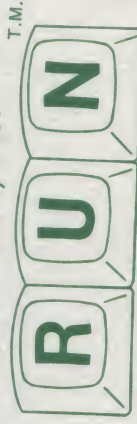


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By Frank J. Derfler and Douglas Ferrata

Today, in the age of the micro-processor, we take hand-held computers like the Texas Instruments Compact Computer 40 for granted.

It Wasn't Very Long Ago

Just a few decades ago, the CC-40 would have been something out of a science-fiction story. At that time, hand-held computing was performed with a slide rule and literally involved rubbing two sticks together to get a spark of inspiration. Items like the Keuffel & Esser Log-Log Duplex Decitrig were the prized possessions of every engineer and scientist.

The K&E was the Mercedes-Benz of slide rules and could handle multiplication, division, logarithms and trigonometry. Slide rules had one big problem, though—they were accurate to only three digits. Serious computations had to be performed on large computers like the IBM 7094.

The 7094 used vacuum tubes and filled a room the size of a large one-room school house. Maybe I should say a small church, because these systems were treated as if they were something supernatural. Only a chosen few, the operators, were allowed to be in the presence of the great machines. The less worthy users could only look at them from afar.

There were no such things as computers for the masses. To use a 7094, you had to punch out your program on a card deck, submit it to the operators through a small window, and wait 30 to 45 minutes—or overnight—for a printout. That was as interactive as it got. If the term "card deck" isn't fa-

miliar to you, you might be able to find something on it in the museum...next to vacuum tubes and slide rules.

In the early '60s, if you wanted to do any serious number crunching, you had to do it in the "computer building." There were no such things as portable or hand-held computers. At that time, a magazine article predicted that by the mid-1980s we would have computers as powerful as that 7094 that would fit into a briefcase and cost around \$100. That was really science fiction!

Well, given the capabilities of the TI Compact Computer 40, and taking in-

flation into account, that prediction was surprisingly accurate. Flash Gordon would feel right at home. Hand-held computing has come a long way.

Sizing Up the CC-40

The TI CC-40 measures $9\frac{3}{4} \times 5\frac{3}{4} \times 1$ inch, weighs about $1\frac{1}{2}$ pounds, and sells for \$249.95. It has a typewriter-like keyboard, a separate numeric keypad and a 31-character liquid crystal display.

The display can be scrolled side-

Contact the authors at PO Box 691 Herdon, VA 22070.



Photo 1. Hand-held computers 1963/1983. The Keuffel & Esser Log-Log Duplex Decitrig and the Texas Instruments Compact Computer 40.

ways to show the contents of a full 80-character line.

The computer is built around a 2.5 MHz TMS70C20 eight-bit microprocessor and comes with 32K ROM and 6K bytes of RAM. Internal RAM can be increased to 18K, and an additional 16K can be added via memory expansion cartridges, bringing the total RAM to 34K.

Information in memory is retained when the computer is turned off by a trickle charge that powers the RAM chips. TI calls this its constant memory feature. Power is provided by either 4 AA batteries or an ac adapter. The batteries power the computer for up to 200 hours and an automatic

power-down feature helps conserve them by turning off the machine after ten minutes of nonuse. This feature can be overridden if desired. A fold-out stand on the back is provided to allow for easy desktop use.

The Display

The liquid crystal display for the CC-40 uses a 5x8 dot matrix and produces a full set of ASCII characters, both upper- and lowercase. In addition it can also produce Greek, Japanese and special user-defined characters.

The display also contains certain indicators showing if the shift, control and function keys are in effect and if the angular measurement is in use

(DEG, RAD and GRAD), as well as the status of the uppercase lock, I/O status, low battery and the position of the screen.

In addition, there are six user-defined indicators on the bottom of the display. Any of these indicators can be turned on or off from a program. Prompts and messages can be displayed on the screen in seven languages. English and German come with the machine and French, Italian, Dutch, Swedish and Spanish can be added with cartridges.

The Keyboard

The keyboard has an arrangement like most larger microcomputers, with a 44-key typewriter portion and a 20-key numeric keypad. The keys click when depressed, like those on a calculator, and if held down have an automatic repeat capability of about ten characters per second.

Some of the keys have up to four uses based on the position of the control, shift and function keys. A clear plastic overlay is provided to show Basic keywords assigned to the alphanumeric and punctuation keys. The Basic keywords are entered by using the function key. One of the drawbacks of the CC-40's small size is that only a small keyboard can fit on it. Unless you have small hands, it's definitely a one-finger-entry machine.

It's Basic

Like most of the other hand-held computers on the market today, the CC-40 comes with its own version of ROM Basic. It's an enhanced version, with some 105 commands, functions and statements. Variable names can be from one to 15 characters long. If you're familiar with some of the more popular versions of Basic, you shouldn't have any trouble with TI's CC-40 version.

About a quarter of the commands are unique, however, and are designed to reduce programming steps and achieve the full potential of the display.

Software Selection

If you aren't into Basic programming, or are interested in off-the-shelf software to make your job easier, the library of software for the CC-40 may be just what you need. This software comes on two types of media—cartridges (Solid State Software) or cassettes (Wafertapes).

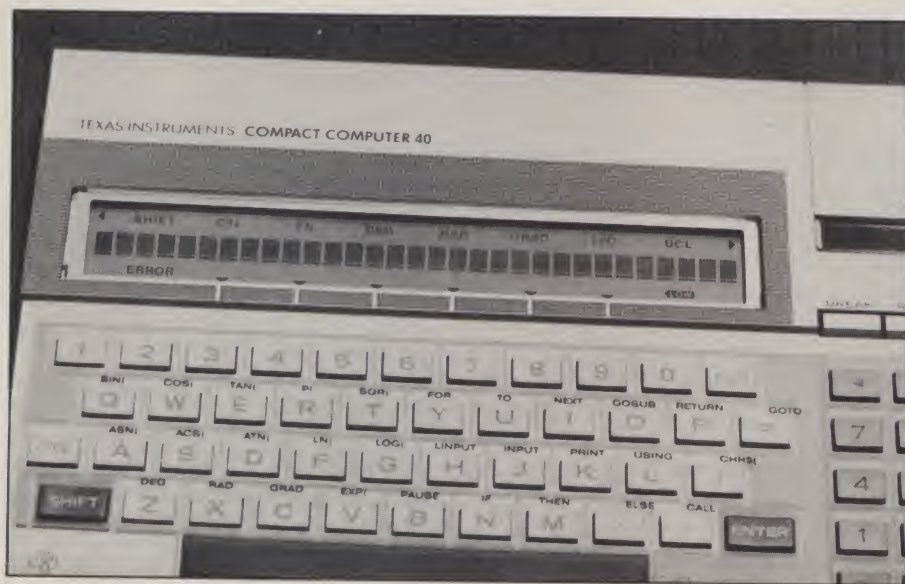


Photo 2. Eighteen display indicators are provided to show various states, warnings and error conditions.

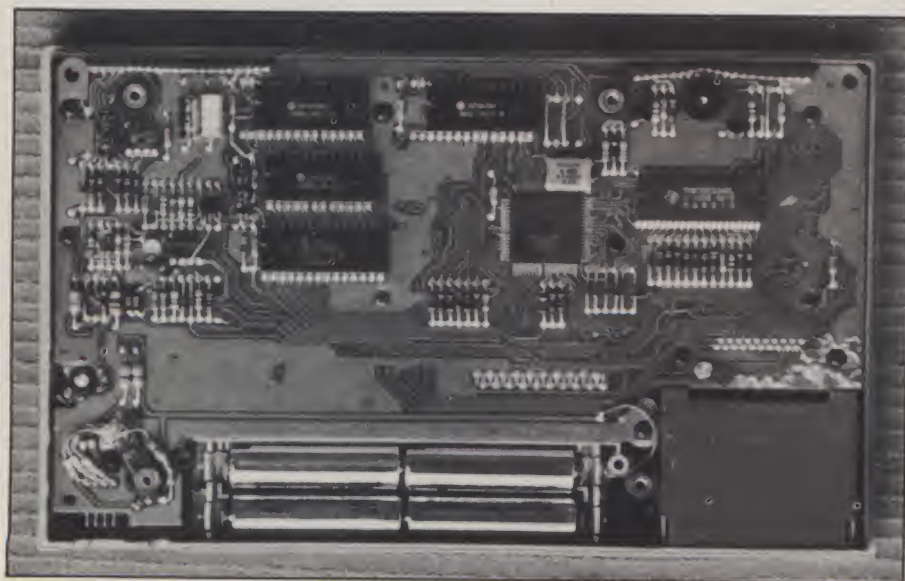


Photo 3. The insides of the CC-40 showing the TMS 70C20 CMOS processor on the right.

The cartridges plug into the same slot on the upper-right-hand corner of the computer as the memory expansion cartridges, and the cassettes are designed for use with the portable digital tape drive.

Software available on the cartridges includes: finance, advanced electrical engineering, statistics, mathematics, business graphics, editor/assembler and games. All have a suggested retail price of \$59.95, except for the editor/assembler, which retails for \$124.95.

The software that comes on cassettes includes: perspective drawing, regression/curve fitting, pipe design, inventory control, photography, solar engineering, quality assurance, thermodynamics, electrical engineering, elementary dynamics, nonparametric statistics, production and planning, and profitability analysis. All cassettes sell for \$19.95.

Based on the difference in price between cartridge and cassette software, it seems that buying a tape drive could well be worth the investment. Each software package, be it cartridge or cassette, comes with its own instruction manual. But should you have any questions concerning any of the software that you have purchased, TI has a toll-free telephone number that you can call for assistance. In addition to the packages mentioned above, TI is working on a word processor and a spreadsheet program. Both should be available in the near future.

Peripherals

Peripherals for the CC-40 are designed to let you significantly increase its power and capabilities over those of most other hand-held computers. Each peripheral has its own built-in microprocessor. This eliminates the need to use the computer's RAM for peripheral control and reduces the size of the interconnecting cable.

The peripherals are connected to the computer through what TI calls its HEX-BUS Intelligent Peripheral Interface. It is a four-bit, medium speed I/O bus that supports data transfer speeds of up to 48,000 bits/second. It uses an eight-line cable with four data lines, two bus control lines, a ground line and an extra line reserved for future expansion. The list of peripherals includes a printer/plotter, a wafertape digital tape drive, an RS-232C Interface, a telephone modem and a video interface.

A list of accessories available for the peripherals includes ac adapters for

the CC-40 and telephone modem, and eight- and 36-inch I/O cables.

Where Does It Fit?

The CC-40 puts the power and speed of a full-blown eight-bit microcomputer into a package the size of a paperback book. Its size allows you to carry it easily in a briefcase or purse, and take it places where only pocket calculators have gone before.

These places could include classrooms, construction sites, factory floors or even courtrooms. Word processing and spreadsheet applications can be done anywhere, not just in places where there is an ac outlet.

The small size, however, imposes some limitations. Thirty-one characters is not a big window on the world and takes some getting used to. Also, the small keyboard is basically a calculator keypad with letters on it. It will never be entered in the touch-typing hall of fame.

In spite of these problems, given the CC-40's price, size and power, it will probably blow away the top-of-the-line hand-held programmable calculators.

It has more memory than the calculators, and Basic beats reverse polish notation any day. The peripherals also give it some of the capabilities of larger microcomputers. So if you want to do some computing on the go, and want to keep your investment low, then the TI CC-40 may be just what you're looking for. ■

A Capsule Look At TI's CC-40

Manufacturer

Texas Instruments, Inc., Dallas, TX.

List Price

\$249.95

Standard Features

Texas Instruments TMS70C20 CMOS eight-bit CPU; 6K RAM; 32K ROM; 64-key keyboard; 31-character LCD; audible tone; cartridge and peripheral ports; enhanced Basic.

Proportions

One and a half pounds; 9 1/4 x 5 1/2 x 1 inch.

Software

Basic, spreadsheet, word processor, engineering and scientific applications, statistics, financial analysis and editor/assembler.

Options and Accessories

Printer/plotter; digital tape drive; RS-232 interface; 300-baud modem; video interface; ac adapter.

Documentation

Users manual describing the hardware and enhanced Basic.

Circle 268 on Reader Service card

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Quick and Dirty Disassembler

Instead of starting a hopeless search for an HX-20 ROM disassembler program, the author took some advice: "Write your own." In this article, he explains the basics of his Basic disassembler.

By Ray Albrektson

"Ican't help it, I just gotta see what's inside it!"

With those famous last words, I voided my Epson HX-20's warranty by opening it and peering at its tiny innards. My curiosity was only temporarily satisfied because I developed an equally burning desire to look inside the HX-20's ROM—there's a whopping 32K there! The built-in monitor allows you to dump the HX-20 memory 15 bytes at a time, but staring at meaningless (to me, anyway) hex bytes was less than satisfying. "I wish I had a disassembler for this thing," I mused.

Write My Own?

The HX-20 uses an oddball CPU (HD6301 by Hitachi) that is claimed to be a CMOS version of the 6801 microprocessor with six additional instructions. The chances of finding such a disassembler program looked slim. "Why don't you write your own?" asked my wife, blissfully ignorant of the inherent difficulties in such an idea. I explained that disassemblers,

like compilers and interpreters, are things that Basic hackers like me just don't sit down and write in an afternoon! Don't teams of professionals slave for months on that sort of program?

Even while speaking I began to realize that a disassembler needn't be that difficult. Why, I could write it in Basic! To keep things simple, I decided not to try to incorporate any kind of labeling for jumps. Since the 6800-series mnemonics were totally unfamiliar to me, I wanted to include a short comment that would give me the gist of what the mnemonic really meant. Since the ROM would probably contain some ASCII strings, I wanted everything printed out in ASCII form as well.

All Those Data Statements

The program in Listing 1 is the result of my labor. It's a quick and dirty, brute-force disassembler that sequentially peeks its way through the Epson's ROMs and sends the disassembled output to the RS-232C port for

printing. Notice that all the information on the HD-6301 op-codes (using Motorola mnemonics) is listed in the data statements in lines 1000-1255. To keep things simple, the line-number of the data statement for a given op-code is the decimal equivalent of the hexadecimal op-code. For instance, the Load Accumulator B-Immediate op-code is C6H, so the data describing it is in line 1198 (C6H = 198D). That data statement includes the Motorola mnemonic (LDAB) and the number of bytes for that instruction (two), followed by the comment (Im =>B) that describes in ten spaces or less what the op-code means. In this case, it means that the byte following the op-code (the "Im = Immediate" data) is to be placed in the B register.

Those Addressing Modes

The SC6501 (like all 68XX microprocessors) uses a gaggle of addressing modes that I am unused to. Just to give me a clue to the type of addressing involved with a particular op-code, I put the letters "im," "di," "in" or "ex" after some mnemonics. These stand for immediate, direct, indexed and extended addressing modes.

In the immediate mode the data to be operated on (the operand) is stored in the second (and sometimes third) byte of an instruction, as in the example I just gave.

With direct addressing, the second byte of the instruction indicates the address where the operand is stored. Since this address is only one byte, this mode can be used only to address data in the bottom 256 bytes of the

Ray Albrektsen (ACPO Box 51, Quezon City 3001, Philippines), is extension faculty with the International School of Theology in Baguio City, Philippines.

```

10 CLEAR 50
20 OPEN "O",#1,"COMO:(47N2B)" 'For Diablo at 1200 baud
30 PRINT #1,CHR$(0)+CHR$(0) 'Send some nulls
40 PRINT #1,CHR$(27)+CHR$(13)+CHR$(80) 'Reset printer
50 PRINT #1,CHR$(0)+CHR$(0) 'Send more nulls
60 PRINT #1," " +CHR$(27)+CHR$(57) 'Set left margin
70 DIM MNC$(256),A(256),COM$(256) 'Dimension arrays
80
90 FOR N = 0 TO 255: READ MNC$(N),A(N),COM$(N): NEXT N=N+1
100 PC=&HE000 'Set disassembly start address here
110 IF L=53 THEN PRINT #1,CHR$(12): 'Print FF at end of page
120 L=0:P=P+1 'Update line and page counters
130 BYTE=PEEK(PC) 'Get value of current disassembly address
140 BYTE$=HEX$(BYTE) 'Convert to hex string
150 IF LEN(BYTE$)<2 THEN BYTE$="0"+BYTE$ 'Add leading zero if necessary
160 PC$=HEX$(PC) 'Convert disassembly address to hex string
170 IF LEN(PC$)<4 THEN PC$="0"+PC$:GOTO 170 'Add leading zeroes
180 MNC$=MNC$(BYTE) 'Lookup mnemonic
190 COM$=COM$(BYTE) 'Lookup comment
200 'Find out if byte is ASCII printable
210 IF BYTE>32 AND BYTE<126 THEN AS$=CHR$(BYTE) ELSE AS$ = "-"
220 A=A(BYTE) 'A = number of bytes in instruction
230 IF N=A THEN GOTO 310 'If all bytes disassembled, go print
240 PC = PC + 1 'If not, point at next disassembly address
250 BYTE=PEEK(PC) 'Get address or data stored there

```

(More

Listing continued.

```

260 IF BYTE>32 AND BYTE<126 THEN AS$=AS$+CHR$(BYTE) ELSE AS$=AS$+"-"
270 B$=HEX$(BYTE) 'Convert it to hex string
280 IF LEN(B$)<2 THEN B$="0"+B$ 'Add leading zero if required
290 BYTES=BYTES+B$ 'Tack this onto first byte
300 N=N+1:GOTO 230 'Increment instruction counter & do again
310 N=1 'Reset instruction counter
320 MNC$=MNC$+RIGHT$(BYTES,LEN(BYTES)-2) 'Construct Mnemonic string
330 'Check if we have a branch instruction
340 IF LEFT$(MNC$,1)<>"B" OR MID$(MNC$,1,2)="I" THEN GOTO 430
350 'Compute branch address for all branch-relative instructions
360 REL=PEEK(PC)+1 'REL = relative address
370 IF REL>127 THEN ADR=PC-(REL-128) 'If REL negative
380 ADR=PC+REL 'If REL positive
390 HADR$=HEX$(ADR) 'Convert it to hex string
400 IF LEN(HADR$)<4 THEN HADR$="0"+HADR$:GOTO400 'Add leading zero(s)
410 MNC$=MNC$(PEEK(PC-1))+""+HADR$ 'Redefine mnemonic
420 'Format & print a line
430 PRINT #1,PC$;TAB(7);BYTES;TAB(16);MNC$;TAB(32);COM$;TAB(46);AS$
440 PC = PC +1: L = L + 1 'Update disassembly address & line counter
'Go back to beginning for more!
450 GOTO 110
1000 DATA 00,1,--
1001 DATA NOP,1,DO NOTHING
1002 DATA 02,1,--
1003 DATA 03,1,--
1004 DATA LSRD,1,D/SHIFT R/L
1005 DATA ASLD,1,D/SHIFT L/A
1006 DATA TAP,1,A=>CCR
1007 DATA TPA,1,CCR=>A
1008 DATA INX,1,X+1=>X
1009 DATA DEX,1,X-1=>X
1010 DATA CLV,1,0=>OVERFLO
1011 DATA SEV,1,1=>OVERFLO
1012 DATA CLC,1,0=>CARRY
1013 DATA SEC,1,1=>CARRY
1014 DATA CLI,1,0=>INTERUP
1015 DATA SEI,1,1=>INTERUP
1016 DATA SBA,1,A-B=>A
1017 DATA CBA,1,A-B
1018 DATA 12,1,--
1019 DATA 13,1,--
1020 DATA 14,1,--
1021 DATA 15,1,--
1022 DATA TAB,1,A=>B
1023 DATA TBA,1,B=>A
1024 DATA XGDX,1,AB<=>X
1025 DATA DAA,1,A=>BCD=>A
1026 DATA SLP,1,CPU SLEEP
1027 DATA ABA,1,A+B=>A
1028 DATA 1C,1,--
1029 DATA 1D,1,--
1030 DATA 1E,1,--
1031 DATA 1F,1,--
1032 DATA BRA,2,ALWAYS
1033 DATA BRN,2,NEVER
1034 DATA BHI,2,IF >
1035 DATA BLS,2,IF > OR =
1036 DATA BCC,2,IF C = 0
1037 DATA BCS,2,IF C = 1
1038 DATA BNE,2,IF <> 0
1039 DATA BEQ,2,IF = 0
1040 DATA BVC,2,IF OVRFLO0
1041 DATA BVS,2,IF OVRFLO1
1042 DATA BPL,2,IF PLUS
1043 DATA BMI,2,IF MINUS
1044 DATA BGE,2,IF >or=0
1045 DATA BLT,2,IF < 0
1046 DATA BGT,2,IF > 0
1047 DATA BLE,2,IF <or=0
1048 DATA TSX,1,SP+1=>X
1049 DATA INS,1,SP+1=>SP
1050 DATA PULA,1,SP+1/M=>A
1051 DATA PULB,1,SP+1/M=>B
1052 DATA DES,1,SP-1=>SP
1053 DATA TXS,1,X-1=>SP
1054 DATA PSHA,1,A=>M/SP-1
1055 DATA PSHB,1,B=>M/SP-1
1056 DATA PULX,1,SP+1/M=>X
1057 DATA RTS,1,RTRN SUB
1058 DATA ABX,1,B+X=>X
1059 DATA RTI,1,RTRN/INT
1060 DATA PSHX,1,X=>M/SP-2
1061 DATA MUL,1,AxB=>A&B
1062 DATA WAI,1,WAIT INT
1063 DATA SWI,1,PROC INT
1064 DATA NEGA,1,00-A=>A
1065 DATA 41,1,--
1066 DATA 42,1,--
1067 DATA COMA,1,/A=>A
1068 DATA LSRA,1,SHIFT R/L
1069 DATA 45,1,--
1070 DATA RORA,1,ROTATE R
1071 DATA ASRA,1,SHIFT R/A
1072 DATA ASLA,1,SHIFT L/A
1073 DATA ROLA,1,ROTATE L
1074 DATA DECA,1,A-1=>A
1075 DATA 4B,1,-

```

More →

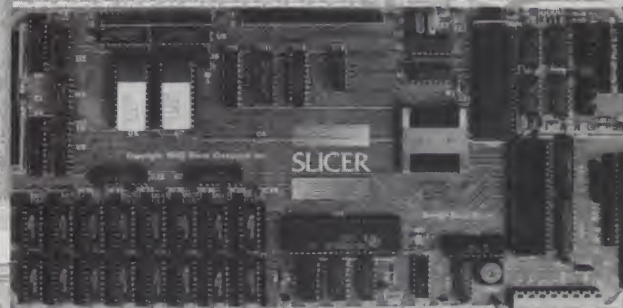
computer.

Indexed addressing adds the second byte of the instruction to the bottom byte of the index (I) register, and the data to be operated on is in the memory location pointed to by that addition. Note that this mode of addressing does not change the index register!

Extended addressing is the most familiar mode for the 8080-family of programmers, but there's a catch. The two bytes following the op-code represent the address where the operand is located, except the second byte is the upper half of the address and the third byte is the lower half of the address.

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Listing continued.

1076 DATA INCA,1,A+1=>A	1136 DATA EORAIM,2,AxorIm=>A	1196 DATA ANDBim,2,BandIm=>A
1077 DATA TSTA,1,TST Oor-	1137 DATA ADCaim,2,A+Im+C=>A	1197 DATA BITBim,2,BandIm
1078 DATA 4E,1,--	1138 DATA ORAAim,2,AorIm=>A	1198 DATA LDABim,2,Im=>B
1079 DATA CLRA,1,0=>A	1139 DATA ADDAim,2,A+Im=>A	1199 DATA C7,1,--
1080 DATA NEGB,1,00-B=>B	1140 DATA CPXaim,3,X-Im;Im+1	1200 DATA EORBim,2,BxorIm=>A
1081 DATA 51,1,--	1141 DATA BSR,2,GOSUB	1201 DATA ADCBim,2,B+Im+C=>A
1082 DATA 52,1,--	1142 DATA LDSim,3,Im=>SP	1202 DATA ORABim,2,BorIm=>A
1083 DATA COMB,1,B=>B	1143 DATA 8F,1,--	1203 DATA ADDBim,2,B+Im=>A
1084 DATA LSRB,1,SHIFT R/L	1144 DATA SUBadi,2,A-M=>A	1204 DATA LDDim,3,Im=>A;B
1085 DATA 55,1,--	1145 DATA CMPadi,2,A-M	1205 DATA CD,1,--
1086 DATA RORB,1,ROTATE R	1146 DATA SBCadi,2,A-M-C=>A	1206 DATA LDxIm,3,Im=>X
1087 DATA ASRB,1,SHIFT R/A	1147 DATA SUBddi,2,A&B-M=>A&B	1207 DATA CF,1,--
1088 DATA ASLB,1,SHIFT L/A	1148 DATA ANDadi,2,AandM=>A	1208 DATA SUBBdi,2,B-M=>B
1089 DATA ROLB,1,ROTATE L	1149 DATA BITadi,2,AandM	1209 DATA CMPBdi,2,B-M
1090 DATA DECB,1,B-1=>B	1150 DATA LDAadi,2,M=>A	1210 DATA SBCBdi,2,B-M-C=>B
1091 DATA 5B,1,--	1151 DATA STAAdi,2,A=>M	1211 DATA ADDddi,2,A&B+M=>A&B
1092 DATA INCB,1,B+1=>B	1152 DATA EORadi,2,AxorM=>A	1212 DATA ANDBdi,2,BandM=>B
1093 DATA TSTB,1,TST Oor-	1153 DATA ADCadi,2,A+M+C=>A	1213 DATA BITBdi,2,BandM=>B
1094 DATA 5E,1,--	1154 DATA ORAadi,2,AorM=>A	1214 DATA LDABdi,2,M=>B
1095 DATA CLRB,1,0=>B	1155 DATA ADDadi,2,A+M=>A	1215 DATA STABdi,2,B=>M
1096 DATA NEGin,2,00-M=>M	1156 DATA CPXadi,2,X-M;M+1	1216 DATA EORBdi,2,BxorM=>B
1097 DATA ALMin,3,MandIm=>M	1157 DATA JSRdi,2,GOSUB	1217 DATA ADCBdi,2,B+M+C=>B
1098 DATA OIMin,3,MorIm=>M	1158 DATA LDSdi,2,M=>SP	1218 DATA ORABdi,2,BorM=>B
1099 DATA COMin,2,M=>M	1159 DATA STSdi,2,SP=>M;M+1	1219 DATA ADDBdi,2,B-M=>B
1100 DATA LSRin,2,SHIFT R/L	1160 DATA SUBain,2,A-M=>A	1220 DATA LDDadi,2,MM=>A&B
1101 DATA EIMin,3,MxorIm=>M	1161 DATA CMPain,2,A-M	1221 DATA STDBdi,2,B=>M
1102 DATA RORin,2,ROTATE R	1162 DATA SBCadi,2,A-M-C=>A	1222 DATA LDxdi,2,M=>X
1103 DATA ASRin,2,SHIFT R/A	1163 DATA SUBdin,2,A&B-M=>A&B	1223 DATA STXdi,2,X=>M;M+1
1104 DATA ASLin,2,SHIFT L/A	1164 DATA ANDain,2,AandM=>A	1224 DATA SUBBin,2,B-M=>B
1105 DATA ROLin,2,ROTATE L	1165 DATA BITain,2,AandM	1225 DATA CMPBin,2,B-M
1106 DATA DECin,2,B-1=>B	1166 DATA LDAain,2,M=>A	1226 DATA SBCBin,2,B-M-C=>B
1107 DATA TIMin,3,Malm=>Flag	1167 DATA STAAin,2,A=>M	1227 DATA ADDdin,2,A&B+M=>A&B
1108 DATA INCin,2,M+1=>M	1168 DATA EORain,2,AxorM=>A	1228 DATA ANDBin,2,BandM=>B
1109 DATA TSTin,2,TST Oor-	1169 DATA ADCain,2,A+M+C=>A	1229 DATA BITBin,2,BandM
1110 DATA JMP,2,JUMP	1170 DATA ORAAin,2,AorM=>A	1230 DATA LDABin,2,M=>B
1111 DATA CLRin,2,0=>M	1171 DATA ADDain,2,A+M=>A	1231 DATA STABin,2,B=>M
1112 DATA NEGex,3,00-M=>M	1172 DATA CPXain,2,X-M;M+lag	1232 DATA EORBin,2,BxorM=>B
1113 DATA AIMdi,3,MandIm=>M	1173 DATA JSRin,2,GOSUB	1233 DATA ADCBin,2,B+M+C=>B
1114 DATA OIMdi,3,MorIm=>M	1174 DATA LDSin,2,M=>SP	1234 DATA ORABin,2,BorM=>B
1115 DATA COMex,3,M=>M	1175 DATA STSin,2,SP=>M;M+1	1235 DATA ADDBin,2,B+M=>B
1116 DATA LSReX,3,SHIFT R/L	1176 DATA SUBAex,3,A-M=>A	1236 DATA LDDin,2,MM=>A&B
1117 DATA EIMdi,3,MxorIm=>M	1177 DATA CMPAex,3,A-M	1237 DATA STDin,2,A&B=>MM
1118 DATA RORex,3,ROTATE R	1178 DATA SBCAex,3,A-M-C=>A	1238 DATA LDxIn,2,M=>I
1119 DATA ASReX,3,SHIFT R/A	1179 DATA SUBDex,3,A&B-M=>A&B	1239 DATA STXin,2,I=>MM
1120 DATA ASLeX,3,SHIFT L/A	1180 DATA ANDAex,3,AandM=>A	1240 DATA SUBBex,3,B-M=>B
1121 DATA ROLex,3,ROTATE L	1181 DATA BITAex,3,AandM	1241 DATA CMPBex,3,B-M
1122 DATA DECex,3,B-1=>B	1182 DATA LDAex,3,M=>A	1242 DATA SBCBex,3,B-M-C=>B
1123 DATA TIMdi,3,Malm=>Flag	1183 DATA STAAex,3,A=>M	1243 DATA ADDDex,3,A&B+M=>A&B
1124 DATA INCex,3,M+1=>M	1184 DATA EORAex,3,AxorM=>A	1244 DATA ANDBex,3,BandM=>B
1125 DATA TSTex,3,TST Oor-	1185 DATA ADCAex,3,A+M+C=>A	1245 DATA BITBex,3,BandM
1126 DATA JMPex,3,JUMP	1186 DATA ORAAex,3,AorM=>A	1246 DATA LDABex,3,M=>B
1127 DATA CLReX,3,0=>M	1187 DATA ADDAex,3,A+M=>A	1247 DATA STABex,3,B=>M
1128 DATA SUBAim,2,A-Im=>A	1188 DATA CPXAex,3,X-M;M+1	1248 DATA EORBex,3,BxorM=>B
1129 DATA CMPAim,2,A-Im	1189 DATA JSRex,3,GOSUB	1249 DATA ADCBex,3,B+M+C=>B
1130 DATA SBCAim,2,A-Im-C=>A	1190 DATA LDSex,3,M=>SP	1250 DATA ORABex,3,BorM=>B
1131 DATA SUBDim,3,A&B-Im=>A&B	1191 DATA STSex,3,SP=>M;M+1	1251 DATA ADDBex,3,B+M=>B
1132 DATA ANDAim,2,AandIm=>A	1192 DATA SUBBim,2,B-Im=>A	1252 DATA LDDex,3,MM=>A&B
1133 DATA BITAim,2,AandIm	1193 DATA CMPBim,2,B-Im	1253 DATA STDex,3,A&B=>MM
1134 DATA LDAaim,2,Im=>A	1194 DATA SBCBim,2,B-Im-C=>A	1254 DATA LDxex,3,MM=>X
1135 DATA 87,1,--	1195 DATA ADDDim,3,A&B+Im=>A&B	1255 DATA STSex,3,X=>MM

This is the opposite of the Intel convention, so beware!

Finally, the branch instructions all use an addressing mode called relative addressing. These are two-byte instructions, and the second byte is added to the lower byte of the word in the program counter. This results in a branch (or jump) to an address from -126 to +129 bytes of the program counter. This is not easy to figure out, so I included a special section in the program to process these branch instructions. The disassembler converts that relative address to an absolute address (such as BRA E01F) to make the program easier to interpret.

How the Program Works

The actual program is straightforward. It begins by reading all that data into a set of three arrays: MNC\$(N),

A(N) and CMT\$(N). These are, respectively, the mnemonic array, the array indicating the number of bytes in the instruction (ranging from one to three), and the comment string.

The program begins by peeking at the memory location specified in line 100 (for example, &HE001). The byte at the location is &H8E or 142 decimal. We know MNC\$(142) is LDS and that it uses the immediate mode of addressing (im). A(142) tells us it is a three-byte instruction, and the comment string CMT\$(142) informs us that LDS means "the next bytes are to go into the Stack Pointer."

The program acts on the number of bytes in the op-code to treat the next one or two peeked-at bytes as data or an address. When done, the program prints a line (see Listing 2) giving the address of the first byte of the instruc-

tion, the actual hex bytes, the mnemonic, the address or data following the mnemonic, the comment and the ASCII character (if printable).

Disassemblers Are Easily Confused!

Not all of the 256 possible op-codes have been implemented in the HD6301 microprocessor. These are indicated in the data table by the hexadecimal number representing the op-code instead of a nonexistent mnemonic. The byte-count of all nonimplemented op-codes is given as 1, and the comment field is a simple but eloquent "--." When encountered in disassemblies, these could be data storage locations or ASCII strings. Either could derail the disassembler, but not for keeps. Consider this simple program:


```

0000 DB ' ' ;close parenthesis in storage
      location
0001 JMP 0005 ;jump to 0005, thereby skip-
      ping next byte
0004 NOP
0005 NOP

```

When assembled it looks like this:

```

0000 65
0001 7E
0002 00
0003 05
0004 01
0005 01

```

If the disassembler were to begin with address 0000, it would mistake the ASCII "' ' " for the HD6301 op-code EIM. EIM is a special three-byte op-code that performs an exclusive-or between a memory byte and the first byte following the EIM op-code. The result is stored in memory at the location pointed to by the index register (I) plus the third byte (00) in the instruction.

The resulting garbage would look like this:

```

0000 EIM 7E00
0003 ASLD
0004 NOP
0005 NOP

```

This example should make it clear that accurate disassembly can take place only when begun on a valid op-code! Even if it doesn't, the disassembler will straighten itself out after it runs into a few one-byte instructions. An example is given in Listing 3; it begins disassembly on E002, which contains data, not an op-code.

Conversing with Other Microprocessors

The disassembled output of this program can be directed to the HX-20's screen or to the built-in printer by substituting "SCRN:" or "LPT0:" in line 30. In addition, this program can be easily adapted to almost any microprocessor just by building a new data table for the new op-codes.

If typing in all those data lines doesn't appeal to you, send me a blank microcassette and a money order for \$10 for a ready-to-run version of the program. It's certainly a no-frills way to find out what's in those ROMs, but it works.

Roaming the ROMs

Using the disassembled listing and the HX-20 monitor, I can happily roam through the ROMs, and who knows what delightful routines I might discover?■

E000	0F	SEI	l=>INTERUP	-
E001	8E04AF	LDSim04AF	Im=>SP	---
E004	8600	LDAAim00	Im=>A	---
E006	9700	STAAdi00	A=>M	--
E008	8604	LDAAim04	Im=>A	--
E00A	9703	STAAdi03	A=>M	--
E00C	8616	LDAAim16	Im=>A	--
E00E	9701	STAAdi01	A=>M	--
E010	8604	LDAAim04	Im=>A	--
E012	9710	STAAdi10	A=>M	--
E014	860A	LDAAim0A	Im=>A	--
E016	9711	STAAdi11	A=>M	--
E018	8602	LDAAim02	Im=>A	--
E01A	974B	STAAdi4B	A=>M	-K
E01C	72804D	OIMdi804D	Mor Im=>M	r-M
E01F	4F	CLRA	O=>A	O

Listing 2. A sample disassembly.

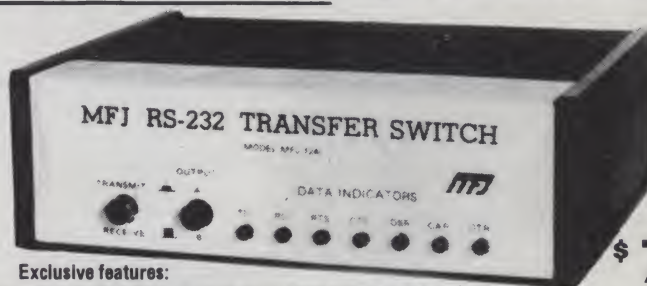
E002	04	LSRD	D/SHIFT R/L	-
E003	AF86	STSIn86	SP=>M;M+1	--
E005	00	00	--	-
E006	9700	STAAdi00	A=>M	--
E008	8604	LDAAim04	Im=>A	--

Listing 3. An example of a disassembly begun on a data byte.

Circle 316 on Reader Service card.

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The VIC-Epson Connection

Make the most of your VIC-20—interface it to an Epson MX-80 printer. It's not only a simple matter, but it's inexpensive as well; you'll spend less than \$20 on parts.

By Thomas Franks

One of the most valuable additions to any home computer system is a printer. As a happy owner of an Epson MX-80, I was already well aware

of this fact. Naturally, when I purchased my VIC-20, one of the first things I wanted to do was interface it to the MX-80.

The Epson printer is not an intelligent device in the same sense that Commodore printers are, so the regular VIC serial port was no good for sending information to the MX-80.

Much to my frustration, I discovered the now well-known fact that the x-line RS-232C system is not implemented on the computer as described in the VIC Programmer's Guide.

Since the MX-80 won't interface properly with just a three-line serial port, my only alternative was to use a parallel interface using the VIC's user port.

```
5 REM **INITIALIZE MX-80 INTERFACE**
10 X=PEEK(55)+(PEEK(56)*256)-82: XH=INT(X/256): XL=X-(XH*256)
20 POKE56,XH:POKE52,XH:POKE55,XL:POKE51,XL
30 FORTY=0:TOB1:READA$
40 IFLEFT$(A$,1)="H"THEN90
50 IFLEFT$(A$,1)="L"THEN100
60 POKEX+Y,VAL(A$)
70 NEXTY
80 PRINT"[CLR][2DN]USE SYS("X+43")":PRINT"[DN]TO INSTALL THE DRIVER":END
90 Z=VAL(RIGHT$(A$,LEN(A$)-1)):POKEX+Y,INT((X+Z)/256):GOTO70
100 Z=VAL(RIGHT$(A$,LEN(A$)-1)):POKEX+Y,(X+Z)-INT((X+Z)/256)*256:GOTO70
200 DATA72,165,251,240,5,104,72,32,L14,H14,104,76,122,242
210 DATA72,169,16,44,29,145,240,251,104,141,16,145,96
220 DATA169,0,160,26,141,17,145,169,8,136,208,253,141,17,145,96
230 DATA169,255,141,18,145,169,140,141,19,145,169,8,141,17,145,169,174,141,
28,14,5
240 DATA169,00,32,L14,H14,32,L27,H27,169,L00,141,38,3,169,H00,141,39,3,96

READY.
```

Listing 1. Basic loader program.

```
10 REM ** VIC-EPSON DEMONSTRATION PROGRAM**
20 POKE 251,1:REM TURN ON THE PRINTER
30 PRINT "HELLO, HOW ARE YOU?":REM TEXT GOES TO SCREEN AND PRINTER
40 POKE 251,0:REM TURN OFF THE PRINTER
50 :
60 REM ** WE CAN DO UNDERLINES! **
70 POKE 251,1:REM TURN ON PRINTER
80 POKE 37137,12:REM TELL PRINTER TO IGNORE A LINE FEED
90 PRINT "UNDERLINE!"
100 POKE 37137,8:REM RESTORE LINE FEEDS TO PRINTER
110 FOR X=1 TO 10:PRINT CHR$(95):NEXT:REM CHR$(95) = AN UNDERLINE
120 POKE 251,0:REM TURN OFF PRINTER
130 :
140 REM ** UPPER AND LOWER CASE DEMO **
150 PRINTCHR$(14):REM SWITCH VIC TO UPPER-LOWER CASE
160 INPUT A$:REM USE UPPER AND LOWER CASE IN A$
170 POKE 251,1:REM TURN ON PRINTER
180 FOR X=1 TO LEN(A$):REM TAKE A$ APART, CHANGE CHARACTERS TO PROPER CASE
190 X$=MID$(A$,X,1)
200 IF ASC(X$)<65THEN250
210 IF ASC(X$)>90THEN230
220 X$=CHR$(ASC(X$)+32)
230 IF ASC(X$)<193 OR ASC(X$)>218 THEN 250
240 X$=CHR$(ASC(X$)-128)
250 PRINT X$:NEXT X
260 PRINT:REM SEND A CARRIAGE RETURN
270 GOTO 160

READY.
```

Listing 2. A program to demonstrate how to program output to a printer.

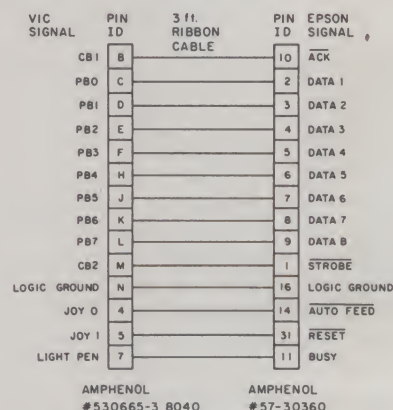


Fig. 1. A description of the parts and wiring necessary to tie printer and computer together.

The only additional item needed to tie the printer and the computer together is the proper cable. Figure 1 shows the details, wiring and parts

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needed. Use a low wattage (12-30 watts) soldering iron; strip only as much insulation as is necessary to make the connection; and keep the connections clean.

The cable I used is three feet long. Cables of more than four feet invite problems in the form of signal degradation.

You should be able to get the parts from a local electronics store or from a mail-order supplier for \$12-\$16.

The user port pins that the cable is tied to are connected to output pins on a 6522 integrated circuit in the VIC. In order to control those outputs, you need a program. It can be done from Basic, using peeks and pokes, but this makes programming text output difficult and listing programs next to impossible.

Listing 1 is a Basic loader program. The data statements are a machine language program. Machine language is the native tongue of the microprocessor chip inside the VIC. Basic is just a big machine language program whose job is to make programming the computer easier on you.

This type of machine language program is sometimes referred to as a "wedge;" that is, you are wedging your program between the Basic program and some smaller program used to get information into or out of the computer.

In this case, the machine language program is wedged between the Basic language and the normal output routines of the VIC. When the VIC goes to put a character on the screen, it has to go through your program first. Telling the VIC to do this, and setting the 6522 to do what you want, is all done by the machine language program.

Type Listing 1 into your VIC. Carefully go over what you have typed, correcting any errors that you keyed in. Make a copy on tape (or disk) when you're sure the program is correct. When you run the program, a message will appear. Write down the SYS(####) that appears in the message.

To install the printer driver, just type the SYS command using the number supplied by the loader program. Your Epson printer should respond by resetting, a procedure it goes through when you turn it on.

Please note two things about the number supplied by the loader program. First, it represents the first address of that part of the machine language that sets everything up

You will have to enter this SYS command any time you hit the restore key to get control of the computer, because restoring the computer disengages your wedge.

Second, this number will be different for VICs with different memory configurations. This is because the loader program automatically locates the machine language in the highest unused area of memory in the VIC it is being used in.

This feature is important because it provides maximum memory to Basic and protects your driver from being destroyed by Basic.

To turn on the printer, simply poke a nonzero value into memory location 251. For example, type

```
POKE251,1:LIST
```

Your MX-80 should print a listing of the loader program.

Listing 2 is a demonstration program that will show you how to program output to the printer. Bear these facts in mind when using this VIC-Epson combination:

1. There are certain characters that the computer uses that the printer cannot print, mainly graphics characters.

2. Outputting lowercase characters to the printer can be a problem due to the fact that Commodore did not chose to use a true ASCII standard

character set.

These two facts are why expensive converters are available to interface nonCommodore printers to the VIC. There are some ways around this. Upper- and lowercase can be handled by software. This is illustrated by the program in Listing 2. Program listings can be solved by altering listings on the screen and then sending them to the printer. For example, the VIC would use two inverted hearts to show that the down cursor key is used twice in a print statement. You can replace that with

```
[2DN]
```

Your VIC can't run a program written like this, but it will list well on the printer.

For those of you who are programming with the HES Forth cartridge, Listing 3 is two screens of definitions that will run the MX-80 with this same cable interface. The variable margin contains a number used by the variable width carriage return (VWCR) as the total spaces inserted to form the left margin. PON turns the printer on, POFF turns the printer off. Use PINIT to install the printer routine (again, disengaged by hitting the restore key). When the word PON is used directly or in another definition, all output that would normally go to the screen will go to the printer. ■

```
SCR # 1
0 DECIMAL
1
2 10 VARIABLE MARGIN
3
4 : VWCR      42005 EXECUTE MARGIN @ SPACES ; ( 42005=CFA OF CR )
5
6 : NEWCR     ' VWCR CFA I/O 6 + ! ;
7
8 : PRES      0 UPORT 1+ C!
9             25 0 DO LOOP
10            8 UPORT 1+ C! ;
11
12 : PINIT     255 UPORT 2+ C! 0 UPORT C!
13            140 UPORT 3 + C! 8 UPORT 1+ C!
14            174 UPORT 12 + C! PRES NEWCR ;
15
SCR # 2
0 ( MORE PRINTER DRIVERS )
1
2 : READY     BEGIN UPORT 13 + C@
3             16 AND
4             UNTIL ;
5
6 : PEDIT      READY UPORT C! ;
7
8 : PON        ' PEDIT CFA I/O 2+ ! ;
9
10 : POFF      VRESET ;
11
12
13
14
15
```

Listing 3. Two screens of definitions to run the MX-80 interface cable with HES Forth cartridge.

The Eagle: A High-Flying PC System

Eagle has joined the flock of IBM-compatible microcomputers with the release of the PC-2 and the 1630. And, according to author Ken Lord, it's hard to find fault with these new machines.

By Kenniston W. Lord

Keeping with industry trends, Eagle has released not one, but two IBM-compatible microcomputers. The advertising literature states prominently, "The Eagle PC...Simply a better PC."

The Makings of an Eagle

Eagle Computer provided two machines for review, each in three parts: a keyboard, a system unit and a monitor.

The first system, the Eagle PC-2, contains 128K of memory and two 320K floppy disk drives. At \$3495, this system includes EagleWriter (a

version of Spellbinder), EagleCalc (a version of UltraCalc) and both the MS DOS and CP/M operating systems. This system costs less than an equivalent IBM system.

The second system, the Eagle 1630, contains 128K memory, one ten-megabyte hard disk and one 780K floppy disk drive. The unusually large storage capacity of the floppy disk drive gives the 1630 the edge over an IBM PC-XT.

The Eagle 1630 costs \$6995 and comes with the same software as the PC-2. Tables 1 and 2 show feature and

cost comparisons for the Eagle PC and Eagle 1600 series of machines.

Keyboard Fits

Identical keyboards are supplied for both machines. The keyboard has 105 keys, all packed into a 19-inch width. The touch is stiffer than the IBM keyboard's but is easy to adjust to.

Of the 105 keys, 24 are function keys. Nineteen of the keys are located across the top of the keyboard, above the number row. The remaining five lie to the lower right of the keyboard, beside the "enhance" key, which switches the display to reverse video.

Although some of the Eagle's function keys are dedicated to the software that comes with the machines, the function keys worked properly with the IBM PC software that I used in testing. Two software packages that rely heavily on function keys—WordStar and a Basic interpretive compiler—worked normally.

The keyboard's cursor-control keys gave me fits. The arrow keys aren't arranged in a diamond-like cluster, as they are on the IBM keyboard. What's more, the left cursor (backspace key) often deletes characters rather than simply moving the cursor one position to the left. It was often easier for me to use a program's control key sequences rather than the cursor control keys. Pg Up and Pg Dn keys are also conspicuously absent, especially since both commands are extremely useful in word processing.

Two keyboard features, one good and one bad, are noteworthy. On the Eagle PC, the keyboard recedes into the system unit (see Photo 1), thus re-



The IBM-compatible Eagle PC.

Address correspondence to Kenniston W. Lord, 45 School St., Winchendon, MA 01475.

ducing the system's footprint. However, the keyboard's coiled cord must be threaded through a small hole and connected inside a covered plate in such a way that the cord doubles back on itself. This results in the loss of about a foot of cord as well as an injured hand.

Screen Scenes

Both systems come with monochrome monitors. Although the monitors' cabinets and power switches are different, they are interchangeable.

The monitor can display 25 lines of 80 characters each. A character cell comprises an 11×14 matrix, with characters using a 7×9 matrix within a cell. The color monitors can display either medium- or high-resolution graphics. Medium-resolution color graphics use an 8×8 cell with a 5×7 character matrix, with a resolution of 320×200 pixels and four colors available. High-resolution color graphics have a 9×14 character cell and a resolution of 640×400 pixels with 16 colors available.

The System Units

The Eagle PC system unit is 13 inches deep and 19 inches wide. The 1630, on the other hand, is as deep as it is wide—a 24-inch table is required to hold it.

The real differences are, of course, on the inside. The Eagle PC has three expansion slots, compared to the 1630's eight. The Eagle PC uses the 8088 microprocessor; the 1630 uses the 8086. My tests showed that the 1630 runs nearly twice as fast as the PC.

Eagle plans to make the 1630 a multi-user system. It claims that when the software becomes available, the network will support 64 terminals.

The systems' interconnect capabilities are also worth noting. Optional ports are available to add hard disk capabilities to the Eagle PC or a second hard disk to the 1630, to connect to a local area network or to connect to a videocassette recorder, which can be used to back up the hard disk.

Software

EagleWriter, EagleCalc, MS DOS and CP/M-86 are included with the machines. (With some versions of the hardware, the operating systems are optional.) Eagle produces GWBasic as an option.

Because of the three-level Basic structure used in the IBM PC, IBM's Basic and BasicA don't work on the Eagles. Compaq's BasicA does work,

however, although Basic's softkey designations don't appear on the Eagle PC's screen.

An Important Point

The default drive in the 1630 is the hard disk, drive A. However, fundamental software is loaded to drive A through the floppy disk drive, drive C, using special utility software that isn't available to the user.

Don't be tempted simply to copy IBM PC disks from drive C to drive A, because although the system and command files have the same names, they aren't the same.

Is the Eagle All It Claims to Be?

It certainly is. The only real fault I can find with the Eagles is their lack of a type-ahead buffer. (A type-ahead buffer lets you type while the computer is doing something else. It stores your keystrokes, then supplies them to the computer as soon as it's ready for them.)

The equipment is good. Because Eagle is marketing its products as business machines, the Eagle PC and 1600 series microcomputers should become a formidable force in the desktop computer market. ■

EAGLE PC SERIES

	PC-E	PC-1	PC-2	PC-XL
Memory*	64K	128K	128K	128K
Microprocessor	8088	8088	8088	8088
Floppy disks	1 DS	1 DS	2 DS	1 DS
	320K	320K	640K	320K
Hard disk	optional	optional	optional	10M
Monochrome	optional	12 inch	12 inch	optional
Monitor		720×352	720×352	
Keyboard	105 keys	105 keys	105 keys	105 keys
Serial ports	2	2	2	2
Parallel ports	1	1	1	2
Expansion slots	3	3	3	3
Available slots	2	1	1	0
EagleWriter	optional	yes	yes	optional
EagleCalc	optional	yes	yes	optional
MS DOS-CP/M-86	optional	yes	yes	optional
Basic	optional	optional	optional	optional
Cost	\$1995	\$2995	\$3495	\$4495

*Expandable to 512K on the system board

Table 1.

EAGLE 1600 SERIES

	1620	1630	1640
Memory	128K	128K	512K
Microprocessor	8086	8086	8086
Floppy disks	2 DS	1 DS	1 DS
	1.6M	780K	780K
Hard disk	optional	10M	32M
Monochrome	12-inch	12-inch	12-inch
Monitor	720×352	720×352	720×352
Keyboard	105 keys	105 keys	105 keys
Serial ports	2	2	2
Parallel ports	2	2	2
Expansion slots	8	8	8
Available slots	4	3	3
EagleWriter	yes	yes	yes
EagleCalc	yes	yes	yes
MS DOS-CP/M-86	yes	yes	yes
Basic	optional	optional	optional
Cost	\$4995	\$6995	\$8995

Table 2.

Solution to a Serial Saga

Problem: Your New printer's parallel port doesn't match your micro's serial port. Instead of buying boards or boxes, build your own converter and create your own compatibility.

By Frank Sergeant

Why buy an expensive serial-to-parallel interface when you can save money by building your own with the RCA 1802 microprocessor and this circuit?

This article explains how to build a simple, inexpensive serial-to-parallel converter using a microprocessor. It also serves as an introduction to building and programming dedicated controllers and an introduction to machine language programming.

Once Upon a Time...

When I received my beautiful new Okidata Microline 92 printer, I was anxious to try it out. Unfortunately, it comes with a parallel port, and my computer has only a serial port.

There are several standard solutions to this common problem. One is to buy the expensive Okidata serial board that plugs inside the printer case. Another way is to buy the less expensive serial-to-parallel converter box that sits between computer and printer.

Instead, I decided to build my own converter, using a somewhat unusual approach.

What the Serial Port Offers

The serial port on my Radio Shack Color Computer uses three lines: a ground line, a data line and a status line.

The computer will not transmit unless the status line is high. The printer must make this line go low when it wants the computer to stop sending. This is known as "handshaking."

The data line transmits a character serially, a bit at a time. It uses the RS-232 signal levels to represent zero-bits and one-bits: a negative voltage between -3 and -12 V represents a one-bit while a positive voltage between +3 and +12 V represents a zero-bit.

When the computer isn't sending any characters, it marks time by keeping the signal at the "one" level (-3 to -12 V), thus sending out a steady stream of ones.

When the computer is ready to send a character, it first sends a "start" bit, which is a zero-bit. Then it sends the eight data bits, one after the other, starting with the least significant bit. Then it sends two "stop" bits, which are one-bits.

The computer can be set up for various speeds, from 110 bits per second (bps) or slower, to 9600 bps. (This speed is commonly called the baud rate.)

The default value for the Color Computer is 600 bps. This can be changed by poking different values in addresses \$0095 and \$0096 (decimal 149 and 150). (See Table 1 for a list of values for various baud rates for the Color Computer.) It's important that the computer and the printer both be set to the same baud rate.

What the Printer Port Needs

Since the printer has only a parallel port, it doesn't know what to do with the serial data. The printer requires that all eight bits (seven bits, optionally) of a character be present, each on its own line, at the same time. Then the printer's STROBE line must be brought low (briefly) to signal that the data is ready.

The printer puts out its own status line to say whether it's ready for another character or whether it's busy. The Okidata Microline 92 makes its status line go high when it *isn't* ready and low when it *is* ready.

This is just the opposite of what the Color Computer needs on its status

Baud Rate	HEX			DECIMAL	
	Poke into	\$95	\$96 or	149	150
110		01	FA	1	202
300		00	BE	0	180
600		00	57	0	87
1200		00	29	0	41
2400		00	12	0	16
4800		00	06 or 07	0	16 or 7
9600		00	01	0	1

Table 1. Color Computer baud rates.

Baud Rate	SW1	SW2
600	off	off
1200	off	on
9600	on	off
19200	on	on

Table 2. Switch settings.

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line. If these two lines were connected directly together, the Color Computer would send data only while the printer was busy.

Somehow we must convert the serial data sent by the computer (using three lines) into the parallel data the printer needs (using many more lines).

The Standard Approach

The usual way to build a serial-to-parallel converter is to use a universal asynchronous receiver-transmitter (UART) chip and a bit rate generator chip. A UART is designed to go both ways—that is, to receive serial data and convert it to parallel and to take parallel data and send it out serially. Driving a printer uses only the half that receives serial data and converts it to parallel.

A bit rate generator chip (sometimes called a baud rate generator), such as the MC14411, generates the reference frequencies needed by the UART. It produces these frequencies by dividing down a 1.8432 MHz crystal.

The Microprocessor Approach

The UART and the bit rate generator are specialized logic devices dedicated to special functions. For this application, they can be replaced with a general-purpose logic device—a microprocessor.

Microprocessor chips are frequently referred to as "computers." You certainly can build computers with them. Actually, though, only a fraction of such chips are used in computers.

Microprocessors really are general-purpose logic devices. Most of them find their way into machinery of one kind or another rather than into "computers." They're general-purpose because, depending on the program, the same microprocessor can perform the functions of a UART or a bit rate generator or of many other dedicated devices.

I used a microprocessor to perform both the UART and the bit rate generator functions needed to interface the computer's serial port to the parallel port on the printer. This is a flexible approach; changes can be made without rewiring—just by changing the program.

The 1802

I chose the RCA 1802, a CMOS microprocessor, because I wanted the interface to use as little power as possible. CMOS devices draw little current. I hoped to power it directly from one of the pins on the printer's parallel port to eliminate both the need for an extra power supply and the extra cord to plug into an outlet.

Lots of Registers

The 1802 has 16 16-bit registers, any one of which can be used for data or addresses. Or any of the 16 can be selected to be the program counter (PC). These registers are named R0-R15.

Either the high byte or the low byte of each register can be addressed. Because of the 1802's wealth of general-purpose registers, its instruction set

looks a little unusual, but it's straightforward and easy to use.

Registers have one primary accumulator—the D register. Except for incrementing and decrementing registers R0-R15, all operations on data take place in the D register.

GHI R5 (get high) copies the upper eight bits of R5 into D. GLO R4 (get low) copies the upper eight bits of R4 into D. PHI R6 (put high) copies the contents of D into the upper half of R6. PLO R3 (put low) copies the contents of D into the lower half of R3.

Carries, borrows and the lost bit in left and right shifts go into the one-bit DF register. This is like the carry flag in most microprocessors.

The Q Output

Pin 4 of the 1802 is an output pin that can be set (to 5 V) with the instruction SEQ (set Q) or reset (to 0 V) with the instruction REQ (reset Q). Thus, the program can turn this line on and off.

Q is connected to the printer's STROBE pin. Since the Q line didn't have enough drive power for this purpose, I amplified it by running it through an inverter (one-sixth of a 4049, also CMOS). That Q gets inverted by the 4049 is not a problem because the 1802's program takes this into account.

External Flags

The 1802 has four input pins—EF1, EF2, EF3 and EF4. These pins detect voltage applied to them; their state can be tested by the program.

When a low voltage (around 0 V) is connected to an external flag pin, its state is called "true." When a high voltage (around 5 V) is connected to an external flag pin, its state is called "false."

The 1802 has a set of branch instructions that test these flag pins and branch accordingly. For example, BN1 (branch if not 1) takes the branch only if EF1 is false (connected to a high voltage); B4 (branch if 4) takes the branch only if EF4 is true (connected to a low voltage).

Timing

Timing is the key to converting serial data to parallel. The easiest way to provide a clock for the 1802 is to hang a crystal across two of its pins. I used the cheapest crystal, the 3.579545 MHz color burst crystal. (It's available from Radio Shack for \$1.69.)

Since this frequency synchronizes everything the 1802 does, and since

	R4 (low half)	DF
INITIAL VALUE	11111111	X
START BIT	01111111	1
FIRST (LEAST SIGNIFICANT) DATA BIT	10111111	1
NEXT DATA BIT	01011111	1
"	00101111	1
"	00010111	1
"	00001011	1
"	00000101	1
"	10000010	1
LAST (MOST SIGNIFICANT) DATA BIT	01000001	0

Fig. 1. This shows the changes in the low half of Register 4 and DF (the carry) as the start bit and then eight data bits of the character A are shifted in from left to right. Because of the way R4 was initialized, DF containing zero is the signal that the entire character has been received.

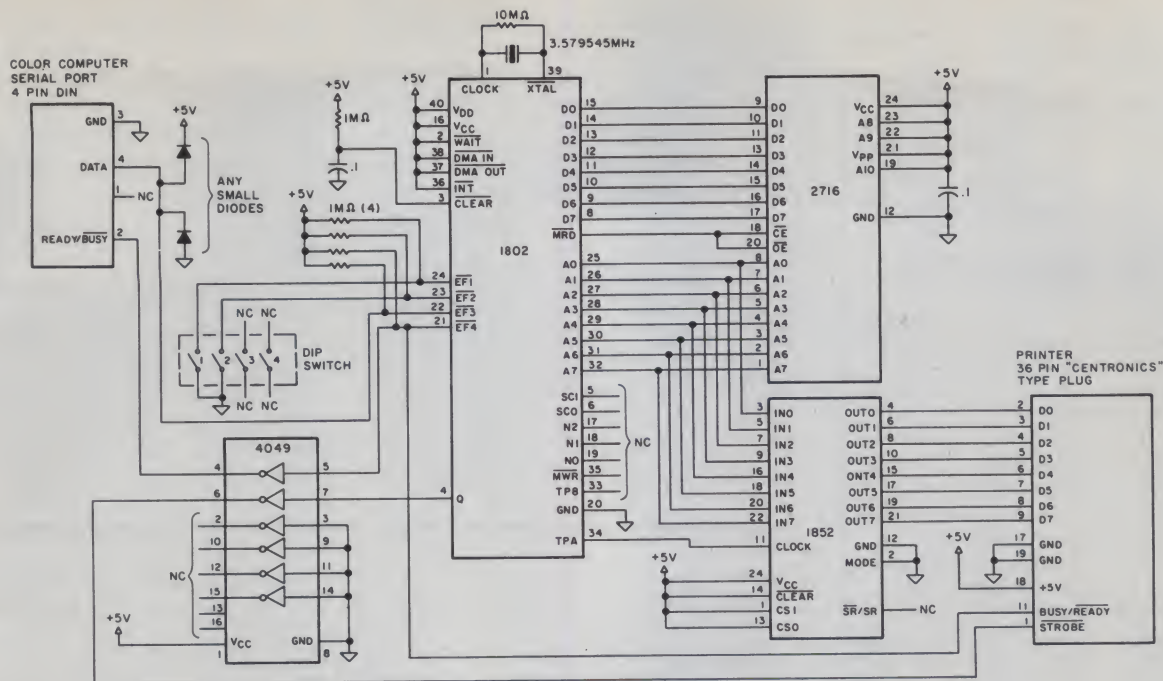


Fig. 2. Schematic for 1802-based serial-to-parallel interface.

we know exactly how long the 1802 takes to perform each instruction, we do not need a separate bit rate generator.

Serial to Parallel in Software

The program must reconstruct, bit by bit, the data byte sent by the serial port. We will use the low half of R4 to hold the byte. We start by initializing R4 to all ones (hex FF).

The timing is handled by a time-killing loop that loads a value in R5 (the low half) and then decrements R5 while it is not zero. The timing for different baud rates is handled by using different starting values for R5.

Generally, the 1802 watches (listens to?) the data line from the serial port. This line is connected to EF3.

When a start bit occurs, the program kills time for 1/2-bit. Then the program sees whether the data line is a zero or a one.

If EF3 is true, you have a one-bit. If EF3 is false, you have a zero-bit. Of course, the very first bit you sample will be a zero-bit, since it's the start bit.

Shift this start bit into R4. Then kill a full bit; this puts you in the middle of the first data bit. Depending on whether EF3 is true or false, you then shift a one or zero into R4. This moves the original start bit over one place. It also shifts the least significant bit out of R4 and into the DF register.

Since you initialized R4 to all ones, the ones will be shifted out of R4 each time you shift in a new bit until, final-

ly, the original start bit (a zero) is shifted out. When this happens, you know you have your full eight bits of data! (See Fig. 1.)

You have just converted the serial data into a byte of parallel data.

Give It to the Printer

The printer's BUSY/READY (status) line is connected to EF4. Once the 1802 has a byte of data ready for the printer, it makes sure the printer is ready by watching EF4. There is no point in sending the byte to the printer if it isn't listening.

When the printer is ready, the data byte is latched to the printer through the 1852 I/O chip. (There is a special trick to this; I'll describe below.) Once the byte has been latched to the printer, Q is turned on and then off as the STROBE signal to tell the printer you have data for it.

Special Trick

I didn't want to have to add an extra chip to this interface in order to have some RAM. Ordinarily, the 1802 can send data only to an I/O port from RAM. If the data is in a register, first you have to store this data to RAM and then write it from RAM to the I/O port. You cannot send it directly from the register.

Here's how to do it without RAM: Since the program fits easily into 256 bytes of ROM, we need only the lower eight address lines. The upper eight address bits aren't connected to the

memory (EPROM) at all.

Sure, you're wasting some of the EPROM, but it's pretty cheap these days. So you can put any data you want into the upper half of the PC *without affecting* the part of the PC that is used to address memory!

Connect the 1852 latch to the address lines so that whatever data is in the upper half of the PC is sent to the printer. Of course, the printer ignores it until you pulse the STROBE line. Sneaky, huh? It saves you a RAM chip, though.

The Hardware

Fig. 2 shows the schematic for this circuit; it consists of four chips: the 1802 microprocessor, the 1852 eight-bit latch, the 4049 hex inverter and the 2716 (2K) EPROM. All of them are CMOS except the EPROM. If necessary for power requirements, a CMOS EPROM could be used.

Only two of the six inverters in the 4049 are used. One of them amplifies (and inverts) Q to give it enough drive to activate the printer's STROBE input. The other inverts the printer's BUSY/READY output so it will have the correct levels for the serial port's READY/BUSY input.

The 1802's address lines are multiplexed. That is, all 16 bits of the address are sent out on only eight lines.

First, the upper eight bits are put on the address lines and TPA (pin 34) is pulsed. Then, the lower eight bits of

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the address are put on the address lines.

The 1852 is an eight-bit latch that is connected to the address lines and TPA so that the 1852's output lines always hold the upper eight bits of the program counter. These output lines are connected to the printer port's data lines.

Only the low eight bits of the address have any effect on the EPROM. This is unconventional, but works because the program fits well within the 256 bytes that eight bits can address.

The EPROM's other address lines (A8, A9, A10) are tied high. Thus, your program sits in the EPROM in the

256-byte block from \$0700 through \$07FF, but this is the same to the 1802 as \$0000 through \$00FF, or \$0100 through \$01FF.

The EPROM's A8, A9 and A10 can be run through a DIP switch so they'll be set manually to one of eight combinations. This allows you to pick which of the eight 256-byte blocks of memory is active. By using this method, you could run any one of eight separate programs, each sitting in its own 256-byte block.

The 1802's EF1 and EF2 are connected to two DIP switches. These switches are used to set the baud rate to one of four possible rates.

```

0700 7A      REQ      make STROBE* inactive
0701 F85A    SET-BAUD-RATE LDI $5A      assume 600 bps
0703 3C0D    BN1 600-OR-1200
0705 F803    LDI $03      set for 9600 bps
0707 3D11    BN2 SET-IT
0709 F800    LDI $00      set for 19,200 bps
070B 3011    BR SET-IT
070D 3D11    600-OR-1200 BN2 SET-IT
070F F82C    LDI $2C      set for 1200 bps
0711 A6      SET-IT      PLO R6
0712 F8FF    GET-BYTE    LDI $FF      initialize
0714 A4      PLO R4      data byte to all ones
0715 3E15    WAIT-FOR-STOP BN3 WAIT-FOR-STOP
0717 3617    WAIT-FOR-START B3 WAIT-FOR-START
0719 86      GLO R6      pick up delay
071A F6      SHR         divide it by two
071B A5      PLO R5
071C 85      KILL-HALF-BIT GLO R5
071D 3222    B2 GET-A-BIT
071F 25      DEC R5
0720 301C    BR KILL-HALF-BIT
0722 3628    GET-A-BIT    B3 ONE
0724 F800    ZERO        LDI $00
0726 302C    BR FIX-CARRY
0728 F801    ONE        LDI $01
072A 302C    BR FIX-CARRY keep paths equal
072C F6      FIX-CARRY   SHR
072D 84      GLO R4
072E 76      SHRC        shift in new bit
072F 3B3A    BNF FULL-BYTE if the start
                                bit fell out
0731 A4      PLO R4      else save partial byte
0732 86      GLO R6
0733 A5      PLO R5
0734 85      KILL-BIT    GLO R5
0735 3222    B2 GET-A-BIT
0737 25      DEC R5
0738 3034    BR KILL-BIT
073A B0      FULL-BYTE   PHI RO      put byte in upper half
                                of PC and thus latch
                                it to 1852 and printer
073B F3      PRINTER-READY? BN4 PRINTER-READY?
073D 7B      STROBE*     SEQ         make STROBE* active
073E C4      NOP
073F C4      NOP
0740 C4      NOP
0741 C4      NOP        kill
0742 C4      NOP        some
0743 C4      NOP        time
0744 C4      NOP
0745 C4      NOP
0746 7A      REQ         make STROBE* inactive
0747 3012    BR GET-BYTE

```

Listing 1. Program for controlling your printer with an 1802.

If you need more than four baud rates, combine this with the technique mentioned in the previous paragraph. This would allow 32 different baud rates, or 16 baud rates with an eight-bit serial character and 16 with a seven-bit serial character.

The four baud rates I picked are 600, 1200, 9600 and 19200 bps. (See Table 2 for switch settings for the different rates.)

EF3 is connected to the data line from the serial port. EF3 is true when a one-bit is being sent and false when a zero-bit is being sent.

EF4 is connected to the printer's BUSY/READY line so the program knows when it may send data to the printer.

The data line from the serial port is diode-clamped to prevent the voltage program line from going negative or above +5 V.

I recommend wire-wrapping this circuit. It's easy to do and is forgiving of mistakes. If you connect a wire to the *wrong place*, just unwrap it.

Understanding the Program

The program is shown in Listing 1. The far left column is the address where the machine code for that line sits. The next column contains the actual machine code in hexadecimal. This is the data that would be burned into the 2716 EPROM.

The third column contains labels that are either explanatory or are referred to by branch instructions. The last column contains the program in assembly language, sometimes followed by comments.

First, REQ (reset Q) makes sure you're starting with the printer's STROBE turned off. Then, the section from Set-Baud-Rate through Set-It reads the two DIP switches that are used to set the baud rate to one of four possible values.

LDI (load immediate) \$5A loads the value \$5A into D. BN1 (branch if not 1) 600-or-1200 branches down to the 600-or-1200 label if EF1 (connected to DIP switch 1) is not true.

If EF1 is true, you might want 9600 bps, so LDI \$03 puts the correct delay value for 9600 bps into D. If EF2 isn't true (and EF1 is), the BN2 Set-It instruction branches to Set-It, where PLO (put low) R6 saves this delay value in the lower half of R6. BR is an unconditional branch.

Through one path or another, the program winds up at Set-It, where the proper delay value gets saved in the low half of R6.

The main loop of the program begins at Get-Byte. That's what you'll do over and over—get a byte from the serial port.

LDI \$FF loads all ones into D, and PLO R4 copies those ones into the low half of R4. Next, you test EF3, with BN3 Wait-For-Stop branching in place if you inadvertently come in during something other than a stop bit. If you come in during a stop bit or after you've waited for a stop bit, you again branch in place with B3 Wait-For-Start until you detect a start bit.

Now you're synchronized with the data coming from the serial port. Pick up the delay for one-bit at the baud rate selected. (Remember, you saved this in the low half of R6.) Then, shift it right with SHR, which has the effect of dividing the delay in half.

This first time, you want to delay for only half a bit. This puts you in the middle of the start bit.

The Kill-Half-Bit routine works by putting the 1/2-bit delay value into the low half of R5, seeing if it is zero yet with the instructions GLO R5 (to put the current value of the counter into D) and BZ Get-A-Bit (to branch if D is zero). If the counter isn't zero yet, decrement it with DEC R5, branch back to check and decrement over and over until it is zero.

At this point you branch to Get-A-Bit. You're in the middle of a bit now, so you sample EF3 with the B3 (branch if EF3 is true). Depending on whether a one-bit or a zero-bit is being sent, load D with binary 00000001 or 00000000. Then put that least significant one-bit or zero-bit into DF with SHR.

The whole point of that sequence of instructions is to set up DF to equal the one- or zero-bit being sent by the serial port. Of course, the first time you do this the bit will be zero because you sampled EF3 during the start bit.

Now that DF holds the proper bit, put the value of the low half of R4 into D with GLO R4. It started out as all ones. Then, shift in to the left side the bit in DF and shift out the right-most bit into DF with the instruction SHRC (shift right with carry) (see Fig. 1).

BNF (branch if DF is not true) Full-Byte branches only to Full-Byte if a zero-bit was shifted out of D and into DF. This happens only after we have shifted in eight data bits. At that time, the original zero-bit (the start bit) is shifted into DF. If you don't have all eight bits yet, you'll store your partially complete data

byte back into R4 with PLO R4. Then you pick up your bit delay value from R6, put it into R5 and kill a full bit's worth of time. This puts you in the middle of the next data bit, and you branch back to get the next bit (BZ Get-A-Bit).

Finally, when you have all eight bits in D, the instruction at address 072F branches you to Full-Byte, where the received byte is put into the high half of R0. R0 is used as the program counter, so its high half is latched to the 1852, which is connected to the printer's data lines.

Since only the low eight bits of the program counter are connected to the EPROM, it makes no difference what you put in the high half of R0 as far as program addressing is concerned.

Once you've sent the printer the eight bits, you have to tell it you have done so. First, test the printer's BUSY/READY status line with BN4 Printer-Ready?, which loops in place until the printer is ready. Then pulse the STROBE line by setting Q (SEQ) and by killing some time with instructions that do nothing but kill time (NOP) and then by resetting Q (REQ).

Finally, with BR Get-A-Byte, you start the cycle over again.

Conclusion

Use this program and circuit as is for a Color Computer/Microline 92 combination. It probably will work unchanged on many other computer/printer combinations as well. I'm currently using it between the Microline 92 and a terminal's auxiliary serial port.

If your printer puts out a READY/BUSY signal (instead of a BUSY/READY signal), connect it directly to the serial port's READY/BUSY signal and to pin 5 of the 4049. Do not connect the printer's BUSY/READY signal directly to EF4; connect pin 4 of the 4049 to EF4 instead.

The flexibility of the microprocessor approach makes this circuit adaptable to a variety of special situations. For example, if your printer doesn't offer the option of an automatic linefeed following a carriage return, you can add it in the software.

Just before the last instruction in the program, test to see if the last character sent to the printer was a carriage return. If so, load D with a linefeed (\$0A) and jump to Full-Byte. Just keep the program within the 256-byte maximum. That shouldn't be too hard, since it takes only 72 bytes now. ■

Buyer's Guide To \$6000-\$10,000 Systems

This month, we conclude our buyer's guide focusing on the big boys—systems in \$6000-\$10,000 range.

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Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014	Lisa	Keyboard— 27⅞ × 18⅞ × 6½ CPU—13⅞ × 18⅞ × 15⅞	48 lbs.	6995	MC68000	16-bit external data path 32-bit processor
Barrington International 738 Airport Blvd. Ann Arbor, MI 48104	E'Lite	10 × 6	20 lbs.	7995	Z-80B	8-bit
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Callan Data Systems 2645 Townsgate Road Westlake Village, CA 91361	Unistar	14½ × 20½	65 lbs.	9450	68000	16-bit
Centurion Computer Co. 1202 East Arapaho Richardson, TX 75081	Microplus	11 × 21½	138 lbs.	8700	CPU 5/CPU 6	8-bit
Cheshire/Xerox 404 Washington Blvd. Mundelein, IL 60060	Systems 744	7 × 9	128 lbs.	7200	Z-80A	8-bit
Codata Systems, Inc. 285 North Wolfe Road Sunnyvale, CA 94086	Codata 3300	8 × 22	38 lbs.	7800-13,500	68000	16-bit
Compal 8500 Wilshire Blvd. Beverly Hills, CA 90211	8200	Keyboard— 17½ × 6 × 25 CPU—20 × 18 × 8	45 lbs.	10,000	Z-80	8-bit
Digilog Business Systems Welsh Road and Park Drive Montgomeryville, PA 18936	S-1800	13½ × 21½	50 lbs.	6995	Dual Z-80A	8-bit
Durango Systems, Inc. 30003 North First St. San Jose, CA 95134	Durango	16 × 28½	65 lbs.	8250	8085	8-bit
Dynabyte 521 Cottonwood Drive Milpitas, CA 95035	Monarch	8 × 19 × 21	41 lbs.	10,000	Z-80B and 8086	8-bit



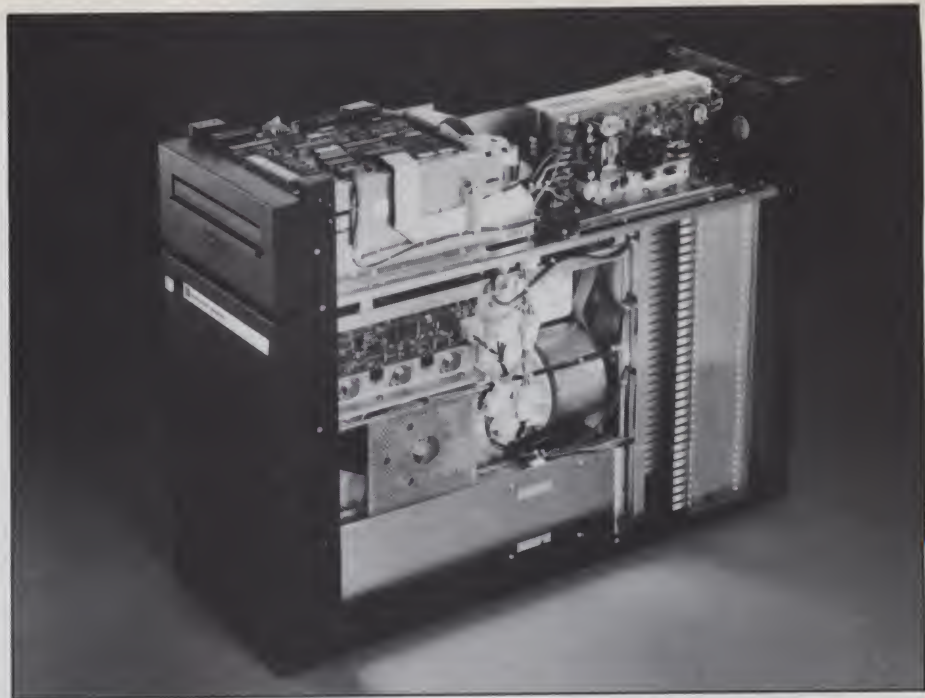
Apple's Lisa features a 16/32-bit configuration and up to 1M of RAM.

Memory Capacity	Disk Drive		Operating System	Hard Drive		Display Format	Color	Interface
	Capacity	Size		Capacity	Size			
64K-192K RAM, 4K ROM	20M	5 1/4"	CP/M, ACE'S DPC/OS	5M	5 1/4"	Monitor not included	N	RS-232, Parallel standard
512K-1024K RAM, 4K-16K ROM	500K	5 1/4"	Xenix (Unix V.7)	10M-40M	5 1/4"	132 x 40	N	RS-232
1M RAM, 16K ROM	860K	5 1/4"	Proprietary	5M	5 1/4"	144 x 45	N	RS-232, Parallel standard
256K RAM	1024K	5 1/4" or 8"	Proprietary	10M-105M	5 1/4"	Monitor not included	N	RS-232, Parallel standard
64K-576K RAM	720K	5 1/4"	Proprietary	10M	5 1/4"	80 x 24	N	RS-232 optional, Parallel standard
256K-512K RAM	1.6M	5 1/4" or 8"	SuperDOS	20M	5 1/4"	80 x 25	N	Parallel standard
256K-1M RAM, 32K ROM	600K	5 1/4"	Unix	21M	5 1/4"	80 x 25	N	RS-232, Parallel standard
64K-256K RAM, 2K ROM	1.17M	8"	OS (CPU-5)	8M-40M	8"	80 x 24	N	RS-232, Parallel standard
64K RAM, 4K ROM	920K	8"	CP/M	10M	8"	80 x 24	N	RS-232, Parallel standard
320K-1.5M RAM	1M	5 1/4"	Unix 15 (Unix V.7)	12M-84M	5 1/4" or 8"	Configurable	N/A	Parallel optional
128K-256K RAM	630K	5 1/4"	CP/M	10M-32M	5 1/4"	80 x 24	N	RS-232, Parallel standard
Dual 64K RAM	800K	5 1/4"	TurboDOS	5M-15M	5 1/4"	80 x 24	N	RS-232, Parallel standard
65K-196K RAM, 10K ROM	14M	5 1/4"	DX85M, CP/M	up to 14M	5 1/4"	80 x 24	Y	RS-232 optional, Parallel optional
256K-1M RAM, 16K ROM	800K	8"	CP/M, Unix, Oasis, MP/M II	19,000K	5 1/4"	Configurable	N	RS-232, Parallel standard



The Grid Compass is a 16-bit portable that weighs only ten pounds.

Manufacturer	Model	Dimensions (in inches)	Weight	Price	Microprocessor	Bit Configuration
Eagle Computer Corp. 983 University Ave. Los Gatos, CA 95030	Eagle 1600	13½ × 11 7/16 × 13	61 lbs.	6995	8086	16-bit
Gifford Computer Systems 1922 Republic Ave. San Leandro, CA 94577	Model 321	14 × 17 × 18½	180 lbs.	9990	8086	8- or 16-bit
Grid Systems Corp. 2535 Garcia Ave. Mountain View, CA 94043	The Compass	2 × 11½ × 15	10 lbs.	8150	8086 and 8087	16-bit
Hewlett-Packard 11000 Wolfe Road Cupertino, CA 85014	HP-1000	19 × 16 × 29	74 lbs.	8780	Z-80	16-bit
IBC Integrated Business Computers 21592 Manilla St. Chatsworth, CA 91311	Cadet	9 × 18 × 30	80 lbs.	10,000	Z-80B	8-bit
	Middl-Cadet	12 × 6 × 19	30 lbs.	7495	Z-80B	8-bit
Intecolor Corp. 225 Technology Park Norcross, GA 30092	Intecolor 8354	13¼ × 19¼ × 26¼	53 lbs.	6495	8080A	8-bit
Micro Five Corp. 17791 Sky Park Circle Irvine, CA 92714	Series 1000 #1440	6 7/16 × 15 5/8 × 16 1/8	33 lbs.	7995	Intel 8088	16-bit
	Series 1000 #1540	6 7/16 × 15 5/8 × 16 1/8	33 lbs.	8995	Intel 8088	16-bit
Molecular Computer 251 River Oaks Parkway San Jose, CA 95134	SuperMicro Series	24 × 12 × 31½	145-170 lbs.	7995	Z-80A	8- or 16-bit
MUSYS Corp. 1752 B. Langley Irvine, CA 92714	Net/Work 8816	24 × 24 × 8	50 lbs.	7495	Z-80, 8086	8- or 16-bit
NNC Electronics 15631 Computer Lane Huntington Beach, CA 92649	Model 80W	17 1/4 × 11 1/4 × 18 1/4	80 lbs.	7350	Z-80B	8-bit
	Model 820	17 1/4 × 7 × 24	60 lbs.	6150	Z-80B	8-bit
	Model 540	17 1/4 × 7 × 18 1/4	50 lbs.	8625	Z-80B	8-bit
	Model 520	17 1/4 × 7 × 18 1/4	45 lbs.	6995	Z-80B	8-bit
Onyx Systems, Inc. 25 East Trimble Road San Jose, CA 95131	Sundance II	14 1/4 × 18 1/4 × 14 1/2	51 lbs.	7590	Z-80	8-bit
	Sundance System 2000	14 1/4 × 18 1/4 × 14 1/2	51 lbs.	6950	Z-80	8-bit
		8 1/4 × 17 × 23	60 lbs.	6750	8088	16-bit
	C5001/MV	17 × 8 × 15	30 lbs.	8740	Z-80	8-bit



SuperMicro 64, from Molecular Computer, can support up to 1M of RAM.

Memory Capacity	Disk Drive		Operating System	Hard Drive		Display Format	Color	Interface
	Capacity	Size		Capacity	Size			
125K-512K RAM, 8K ROM	13.5M	5 1/4"	CP/M	12M	5 1/4"	80 x 25	Y	RS-232, Parallel
320K-1M RAM	1.2M	8"	CP/M	21M	5 1/4"	80 x 24	N	RS-232, Parallel standard
256K RAM, 16K ROM	360K	5 1/4"	CCOS, MS DOS	10M	5 1/4"	320 x 240	N	RS-232, Parallel standard
128K-4M RAM	270K	5 1/4"	RTE A.1	16.5M-132M	5 1/4"	80 x 24	Y	RS-232, Parallel standard
256K-512K RAM, 1K ROM	4M	8"	Oasis, MP/M	20K-160K	5 1/4"	Monitor not available	N/A	RS-232, Parallel standard
256K-512K RAM, 4K ROM	1M-2M	5 1/4"	Oasis, MP/M	20M-40M	5 1/4"	Monitor not available		RS-232, Parallel standard
8K-24K RAM, 22K ROM	1182K	8"	File Control System	Not Available		80 x 48	Y	RS-232, Parallel standard
128K-512K RAM, 16K ROM	1M	5 1/4"	CP/M	12.8M	5 1/4"	80 x 25	Y	RS-232, Standard
128K-512K RAM, 16K ROM	1M	5 1/4"	CP/M	19M	5 1/4"	80 x 25	Y	RS-232, Standard
64K-1M RAM	500K-1M	8"	N/Star	10M-60M	5 1/4", 8" or 14"	Monitor not available	N/A	RS-232, Standard
128K RAM, 4K ROM	Variable	5 1/4"	TurboDOS	16M-102M	5 1/4"	80 x 24	N	RS-232, Parallel standard
64K-1M RAM, 4K ROM	996K	8"	Oasis, CP/M	8160K	8"	80 x 25	N	RS-232, Parallel standard
64K-1M RAM, 4K ROM	996K	8"	Oasis, CP/M	19,584K	5"	80 x 25	N	RS-232, Parallel standard
64K-1M RAM, 4K ROM	996K	5 1/4"	Oasis, CP/M	39,168K	5"	80 x 25	N	RS-232, Parallel
64K-1M RAM, 4K ROM	996K	5 1/4"	Oasis, CP/M	19,584K	5"	80 x 25	N	RS-232, Parallel
192K RAM	Not Applicable		CP/M, MP/M, Oasis	7M-21M	5 1/4"	80 x 24	N	RS-232, Parallel
64K RAM	Not Applicable		CP/M, Oasis	7M-21M	5 1/4"	80 x 24	N	RS-232, Parallel
64K-256K RAM	1M-1.6M	5 1/4" or 8"	Business Basic, MP/M-86	6M-18M	5 1/4"	80 x 24	N	RS-232, Parallel
256K RAM	Not Applicable		CP/M, MP/M, Oasis	14M-21M	5 1/4"	80 x 24	N	RS-232, Parallel



The Sundance II supports three users under the MP/M and Oasis operating systems.

Manufacturer	Model	Dimensions (in inches)	Weight	Price	Microprocessor	Bit Configuration
Paradyne Corp. 8550 Ulmerton Road Largo, FL 33540	PDS VIP	7¼ × 17½ × 16	30 lbs.	6855	LSI 8086	16-bit
Plessey 17466 Daimler Irvine, CA 92714	6200	5¼ × 19	65 lbs.	7660-11,760	LSI 11/23	16-bit
Quay Corp. 22 Meridian Road Eatontown, NJ 07724	Model 910	7½ × 17½ × 22	70 lbs.	8495	Z-80A	8-bit
	Model 570	6 × 16 × 18	40 lbs.	6295	Z-80A	8-bit
	Model 936	7½ × 17½ × 22	70 lbs.	9995	Z-80A	8-bit
Sumicom, Inc. 17862 East 17th St. Tustin, CA 92680	Systems 830	20 × 22 × 27½	125 lbs.	6995	Z-80B	8-bit
Tab Products Co. 1451 California Ave. Palo Alto, CA 94304	1630	13 × 19¼ × 19¼	65 lbs.	7785	8088	16-bit
	1650	13 × 19½ × 19½	65 lbs.	8070	8088	16-bit
	830	13 × 19½ × 19½	65 lbs.	7500	8085	8-bit
Televideo Systems, Inc. 1170 Morse Ave. Sunnyvale, CA 94086	TS1602	13½ × 22½ × 14¼	48 lbs.	6995	8088	16-bit
	TS806-20	7¼ × 17½ × 16½	50 lbs.	6995	Z-80A	8-bit
Texas Instruments PO Box 402430 Dallas, TX 75234	System 300	CPU—3½ × 19½ Keyboard—14½ × 18	35 lbs.	9995	TMS 99000	16-bit
Torch Computers Ltd. 50 Milk St. Boston, MA 01209	Torch Microcomputer	13 × 22 × 15	55 lbs.	6500	Z-80 and 6502	8-bit
Wicat Systems 1875 South State St. Orem, UT 84057	System 150	16 × 19 × 16½	50 lbs.	9450	MC68000	16-bit
Wintex Computer 528 Morse Ave. Schaumburg, IL 60193	Wintex Model MT86	17 × 20 × 20	75 lbs.	8540	8086	16-bit
Wordplex Corp. 141 Triunfo Canyon Road Thousand Oaks, CA 91360	Model 80-3	18 × 17½	56 lbs.	9200	Z-80	8-bit



The Sumicon System 830 features a Z-80 microprocessor.

Memory Capacity	Disk Drive		Operating System	Hard Drive		Display Format	Color	Interface
	Capacity	Size		Capacity	Size			
Variable	640K	5 1/4"	MS DOS	Not Available		80 x 24	N	RS-232, Parallel
256K-1M RAM	2M	8"	RT11, RSX11M, RSX11M	10M-40M	5 1/4"	Monitor not included	N/A	RS-232, Parallel optional
208K RAM, 32K ROM	1.25M	8"	MP/M	10M	8"	80 x 24	N	RS-232, Parallel
64K-208K RAM, 32K ROM	800K	5 1/4"	CP/M, MP/M	20M	5 1/4"	80 x 24	N	RS-232, Parallel
208K RAM, 32K ROM	1.25M	5 1/4"	MP/M	36M	5 1/4"	80 x 24	N	RS-232, Parallel
128K-256K RAM, 2K ROM	1M	8"	CP/M	8M-16M	5"	640 x 400 pixels	Y	RS-232, Parallel
128K-768K RAM	630K-1.2M	5 1/4" or 8"	CP/M-86	5M-10M	5 1/4"	132 columns x 27 lines	N	RS-232, Standard
256K-768K RAM	630K-1.2M	5 1/4" or 8"	MP/M-86	5M-10M	5 1/4"	132 columns x 27 lines	N	RS-232, Standard
64K-768K RAM	630K-1.2M	8"	CP/M 2.2	5M-10M	5 1/4"	132 columns x 27 lines	N	RS-232, Standard
256K RAM, 4K-16K ROM	500K	5 1/4"	CP/M-86	19,100K	5 1/4"	80 x 24	N	RS-232
64K RAM, 4K ROM	500K	5 1/4"	CP/M	20M	5 1/4"	Monitor not included	N	RS-232, Parallel
128K-512K RAM	1.2M	8"	DX10	5M-43M	5 1/4" or 8"	80 x 24	N	RS-232
96K RAM, 52K ROM	400K	5 1/4"	CPN (runs CP/M software)	10M-21M	5 1/4"	80 x 32	Y	RS-232
256K-1M RAM, 64K ROM	616K	5 1/4"	MCS and Unix	10M-45M	5 1/4"	80 x 25	N	RS-232, Parallel
256K-928K RAM, 96K ROM (nonvolatile)	655K	5 1/4"	CP/M-86, RMX-86	10M-32M	5 1/4"	128 x 64	N	RS-232
64K-128K RAM, 2K ROM	128K	5 1/4"	FDOS, Gemini	Not Available		80 x 25	N	RS-232



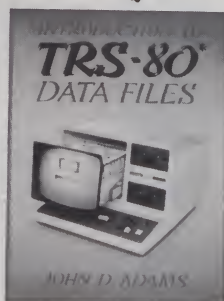
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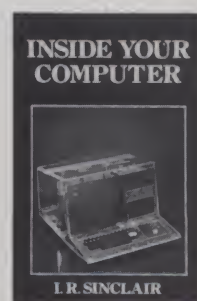
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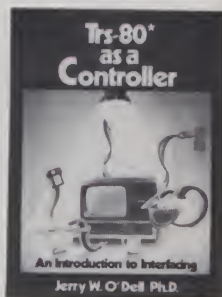
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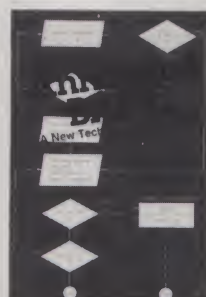
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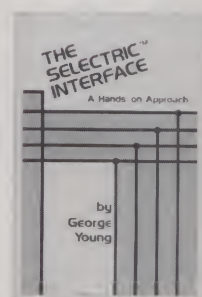
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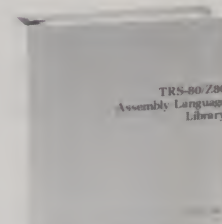
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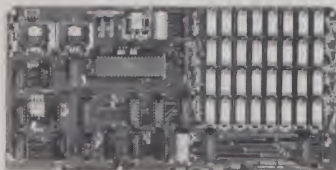
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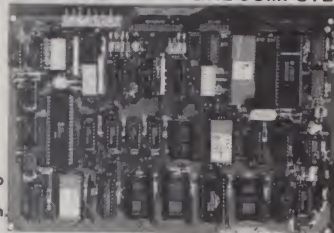
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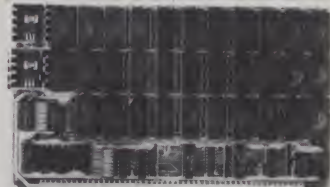
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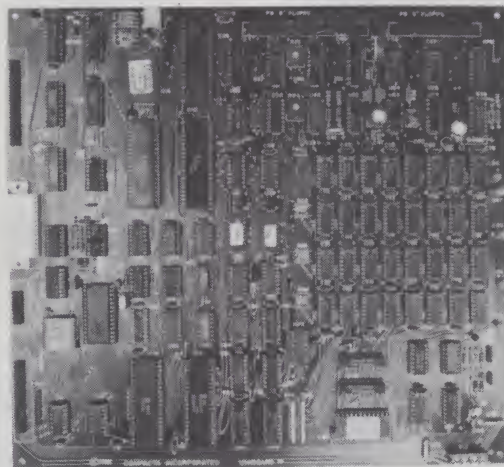
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Micro Software Digest

Compiled by Tracy Mayor

Micro Software Digest presents capsulized software reviews from various computer-related publications.

Super Speed Reading

System Requirements: Apple II or II Plus; 48K RAM; ROM Applesoft; at least one disk drive

Manufacturer: Magnum, 21115 Devonshire St., Suite 337, Chatsworth, CA 91311

Price: \$149

Comments: As the review says, Super Speed Reading "takes good advantage of the computer" to help the would-be speed reader. Based on methods developed by J. Carson Kovar, the program prompts you to move your eyes down a page of print as quickly as possible.

The computer can also work as a timer with plenty of flexibility so you can set your own pace. A metronome option is also available, and you can check your progress at any time. Results can be presented on a bar graph. Reader Service number 404.

(Reviewed in Softalk, September 1983)

Real Estate Models for the 80s/ Real Estate Investor

System Requirements: For Real Estate Models for the 80s: Apple II or III with 48K RAM, DOS 3.3, one disk drive; or Apple III with 96K RAM; or IBM PC with 64K RAM, PC DOS 1.1, one disk drive; or HP-125 with 64K RAM, one disk drive. For Real Estate Investor: Apple II or II Plus; DOS 3.3; 64K RAM; one disk drive; 16-sector VisiCalc

Manufacturer: Real Estate Models for the 80s is from Commercial Software Systems, Inc., 7689 West Frost Drive, Littleton, CO 80123; Real Estate Investor is from Simple Soft, 480 Eagle Drive, Suite 101, Elk Grove, IL 60007

Price: Real Estate Models for the 80s—\$65; Real Estate Investor—\$129.95

Comments: Real Estate is a perennial investment favorite, and now there are two new programs to help you invest wisely. Real Estate Models for the 80s assumes familiarity with amortization, depreciation and interest. Sixteen templates are provided to run with VisiCalc; topics include cash flow and equity return, tax considerations and mortgage calculations. The review says this package is excellent for "people who have a comprehensive understanding of the real estate market."

Real Estate Investor, also for use with VisiCalc, is designed for investing on a personal level. The templates analyze your economic profile and data on a potential investment, which then "allows you to make a more informed decision about a home or a business." The two main systems of the package are residence analysis and property analysis. Supporting income and expense schedules also provide help. Reader Service number 414.

(Reviewed in InfoWorld, June 27 and July 25, 1983)

Diversi-DOS

System Requirements: Apple II or II Plus; 48K RAM; ROM Applesoft; at least one disk drive

Manufacturer: Diversified Software Research, 5848 Crampton Court, Rockford, IL 61111

Price: \$30

Comments: Some DOS systems for Apple are hindered by their copy protection, but Diversi-DOS has neatly sidestepped the problem. The designer has thoughtfully provided a utility to copy the program onto a DOS 3.3 disk.

You are encouraged to pass it along to your friends, and if they like it, they're asked to forward checks to the company. Prices are even low enough to (hopefully) keep people honest. According to the review, "It could be the best try-before-you-buy policy in the industry." Reader Service number 408.

(Reviewed in Softalk, May 1983)

SpeedSTAT 1

System Requirements: Apple II, II Plus, or IIe; DOS 3.3; 48K RAM; two disk drives; printer

Manufacturer: SoftCorp International, 229 Huber Village Blvd., Westerville, OH 43081

Price: \$249

Comments: SpeedSTAT 1 is a statistical report writer that presents statistics "in a manner that is forgiving both of statistical naivete and computer inexperience." The package includes four different report types—raw data, data summary, one-way frequency tables and two-way cross tabulations.

SpeedSTAT 1 formats statistics to be printed 8½ × 11 inches so they are ready for report inclusion. The review opines that the program's versatility "should appeal to researchers in a wide variety of disciplines." Reader Service number 403.

(Reviewed in InfoWorld, July 7, 1983)

Filefix

System Requirements: CP/M 2.2; 8080/8085 or Z-80 processor

Manufacturer: Digital Marketing, Walnut Creek, CA 94595

Price: \$89

Comments: Filefix is a collection of disk-utility programs designed to aid file recovery. Long and short disk directories are included—both display the names of regular and erased files. Files can also be renamed.

The package has a safety feature that changes erased names so that they can still be recovered at a later date. Several other functions are included. According to the review, Filefix has some "clever, problem-solving approaches that save the user both time and work." Reader Service number 401.

(Reviewed in Interface Age, May 1983)

Microcomputer Circuit Analysis Program

System Requirements: Apple II or II Plus; 48K RAM; ROM Aplesoft; at least one disk drive

Manufacturer: Spectrum Software, 690 West Freemont Ave., Sunnyvale, CA 94087

Price: \$475

Comments: Put fun back into circuitry by computerizing the drudgery—namely, building and testing design. Microcomputer Circuit Analysis Program has a designer module and three analyzer modules. According to the review, "perhaps the most important is a program that allows the user to establish parameters for the standard components that are used."

Circuits are drawn on the screen and then run through several simulations. Circuits can be analyzed by ac, dc or transient methods. The review concludes, "For many consultants and small design groups, this extensive program will be a real godsend." Reader Service number 405.

(Reviewed in Softalk, May 1983)

Home Finance Systems

System Requirements: Heath/Zenith H89, Z90 or H8; HDOS 2.0 with Basic; 56K RAM; 5¼-inch or eight-inch drives

Manufacturer: Jay Gould Software, Box 2024, Des Moines, IA 50310

Price: \$89

Comments: As the review says, "If you've been wondering where all your money goes, you may be a prime candidate for the Home Finance System." HFS takes all your financial transactions and separates them into three accounts—checking, assets and credit.

Information can be designated as taxable or nontaxable. There's even a feature that prints checks for you—the only thing HFS doesn't do is sign the documents for you. Reader Service number 406.

(Reviewed in InfoWorld, August 22, 1983)

Edit-80

System Requirements: CP/M; disk drive

Manufacturer: Microsoft, Inc., 10700 Northrup Way, Bellevue, WA 98004

Price: \$120

Comments: Edit-80 is a text editor for all Microsoft languages. It's possible to both create and edit programs for Fortran, Macro, MS Basic and others. Edit-80 creates an index file which makes loading text files faster.

Editing is done both interline and intraline; an entire range of lines may be adjusted as well. Recommends the review, "If you do much non-word-processing text entry, this may be the one for you." Reader Service number 409.

(Reviewed in InfoWorld, August 22, 1983)

T/MAKER/III

System Requirements: a 2.2 CP/M system; disk drive

Manufacturer: T/MAKER Company, 1742 Willow Road, #206, Palo Alto, CA 94304

Price: \$275

Comments: According to the review, "T/MAKER/III integrates many useful computer tasks into one package." Functions include text editing, word processing, data management and spreadsheet abilities.

Word processing features are extensive and include some printer abilities as well. Spreadsheet functions are also impressive and T/MAKER/III allows you to store or print all information. As the review asserts, "T/MAKER is a superb product." Reader Service number 417.

(Reviewed in InfoWorld, July 7, 1983)

Macro-80

System Requirements: CP/M; eight-inch, single-density, single-sided CP/M disk format

Manufacturer: Microsoft, 10700 Northrup Way, Bellevue, WA 98004

Price: \$200

Comments: If you have a CP/M 80-based system, Macro-80 could be for you. The assembly language program can be used in conjunction with higher Microsoft languages or by itself. Features include an assembler, a linking loader, a cross-reference utility and a library management utility.

Macro-80 is designed for the sophisticated programmer, but the review also observes that it "can serve as a simple, straightforward, assembly language product if you just ignore those features you don't understand." Reader Service number 420.

(Reviewed in InfoWorld, July 11, 1983)

Type Faces

System Requirements: IBM PC; PC DOS; 64K RAM; two disk drives; Epson Series 80 or 100, IDS 460/560 or Prism 80/132 printer

Manufacturer: Alpha Software Corporation, 12 New England Executive Park, Burlington, MA 01803

Price: \$125

Comments: Type Faces allows you to print large type characters with your printer. After the text is copy-reduced, the results look almost as if they were typeset.

There are 15 different styles to choose from and type can be mixed on the same page (although not in the same line). Type is usually two to three times larger than regular printer type—reductions look best at 70 to 50 percent. The review opines that although advanced users may find some limitations, "Type Faces easily accomplishes all that it promises." Reader Service number 416.

(Reviewed in InfoWorld, June 27, 1983)

Soflok

System Requirements: IBM PC; PC DOS 1.1; 32K RAM; two disk drives

Manufacturer: Olive Branch Software, 1715 Olive St., Santa Barbara, CA 93101

Price: \$150

Comments: According to the review, copy protection motivations "range from corporate security to simple possessiveness." Soflok is designed for basic, personal protection. The program acts as an interface between operating system and protected program, which can be run normally but not copied.

Although Soflok cannot protect against bit copiers, it is still useful for personal needs. If you market a product with Soflok protection, the company doesn't require royalty payments. Reader Service number 407.

(Reviewed in InfoWorld, July 11, 1983)

Kindercomp

System Requirements: Atari computer, IBM PC or Apple II Plus with 48K and DOS 3.3

Manufacturer: Spinnaker Software Corp., 215 First St., Cambridge, MA 02142

Price: \$29.95

Comments: If you're in the process of raising a "state-of-the-art" infant, Kindercomp will be of interest. The package consists of six programs that teach children different aspects of numerical and alphabetical functions.

As the review asserts, the program is "equally valuable as 'doorways' for children to enter the world of computers." Wrong answer signals are designed so that they won't intimidate. A string of pluses accrues when the child catches on. Reader Service number 410.

(Reviewed in COMPUTE!, May 1983)

Easytext

System Requirements: IBM PC or compatible; PC DOS 1.1 or 2.2; 64K RAM; a single-sided, double-density disk drive

Manufacturer: Norell Data Systems Corp., 3400 Wilshire Blvd., Los Angeles, CA 90010

Price: \$79.95

Comments: Easytext works best in conjunction with the IBM PC EDLIN text editor. Together, the two programs perform most of the duties of an ideal word processor. Easytext divides and spaces your document, specifies headings and footnotes, and numbers pages.

You can perform many printer functions, such as underlining and overprinting—there's 56 functions in all. The review sums up, Easytext is "useful, economical, usable and trouble free." Reader Service number 419.

(Reviewed in InfoWorld, July 18, 1983)

Research Assistant

System Requirements: VIC-20; at least 8K RAM; a Commodore disk drive; printer

Manufacturer: TOTL Software, Box 4742, Walnut Creek, CA 94596

Price: \$25

Comments: Students take note—and you can now do so on a VIC-20 with cassette tape and later assemble indexes and files. Research Assistant allows you to create a data file of notes and to cross-reference your information.

The program supports a function that allows any portion of the files or cross-reference to be printed along with bibliographic references and keywords and dates. According to the review, the cross-reference function far surpasses anything that can be done by hand, and the "ability to organize the data is amazing." Reader Service number 411.

(Reviewed in InfoWorld, August 22, 1983)

Check Book

System Requirements: Timex/Sinclair 1000 or Sinclair ZX-81; 16K RAM; cassette player/recorder

Manufacturer: American Micro Products, Inc., 705 North Bowser St., Richardson, TX 75081

Price: \$17.95

Comments: Check Book not only keeps records on your checking account by number, use and sequence, it also categorizes each check. You can budget as well as keep track of where all those hard-earned dollars are going. The review observes that Check Book "certainly eases the odious chore of organizing records."

It is possible to call up any specific category and see how much has already been spent. Although the program is not totally safe from input error messages, its "organized format and smooth performance" make it a "worthwhile program." Reader Service number 413.

(Reviewed in InfoWorld, July 11, 1983)

Complex Extended Library

System Requirements: a CP/M or DOS system; Microsoft F-80 Fortran compiler; one disk drive

Manufacturer: N/C Data, PO Box 993, Mountain View, CA 94042

Price: \$129.50

Comments: Complex Extended Library allows the Microsoft Fortran compiler to have complex data capabilities. With CEL, you can "compute the sum, difference, product and quotient of two complex variables or constants."

Real and imaginary number functions are possible. The package includes coverage of several complex variable functions not normally included in Fortran syntax. Reader Service number 421.

(Reviewed in InfoWorld, June 13, 1983)

TaxCut IBM Version

System Requirements: IBM PC; PC DOS; 128K RAM; one or two disk drives; printer with tractor feed

Manufacturer: United Micro Systems, Inc., 711 East River Front Drive, Tucson, AZ 85719

Price: \$250

Comments: Come April, many computer enthusiasts may want to reach for TaxCut—it can even help you write off some computer expenses. The review observes, "TaxCut lets you calculate and analyze your taxes without getting in the way."

TaxCut handles most IRS forms and computes according to the latest tax laws. Four disks are included—two for standard forms, one for depreciation and one for printing the return. TaxCut won't work on your state forms but is useful for all federal forms. The price of the program can even be written off—what a loophole! Reader Service number 418.

(Reviewed in InfoWorld, July 4, 1983)

COMPUTE! published by Small Systems Services, Inc., PO Box 5406, Greensboro, NC 27404.

InfoWorld, published by Popular Computing, Inc., 375 Cochituate Road, Box 880, Framingham, MA 01701.

Interface Age, published by McPheters, Wolfe and Jones, 16704 Marquardt Ave., Cerritos, CA 90701.

Softalk, 11160 McCormick St., North Hollywood, CA 91601.

Table. Addresses of the magazine published in software reviews digested in this department.



Well, the problem could be the quality of tape you're using. For instance, this tape is marked "The Sex Pistols."

A Directory for Micro Book Collectors Simulation for Problem-Solvers How to Buy a Business Computer Going for Broke with Money-Making Releases

The Reader's Guide To Microcomputer Books

Michael Nicita and Ronald Petrusha
Golden-Lee Books, 1982
1000 Dean St.
Brooklyn, NY 11238
Softcover, 409 pp., \$9.95

The Reader's Guide to Microcomputer Books is a by-product of the huge and growing microcomputer book market: as more Apple and Commodore and TRS-80 and Atari and IBM computers are sold, there's a proportional increase in the number of books available.

The computer owner who wants to learn more about the field faces a wide and complex array of titles. *The Guide* tries to cut through this huge selection with mini-reviews of more than 400 books.

Each book is listed by title and author, ISBN number, price and publisher. Unfortunately, though, the addresses of publishers were left out; the reader who wants to buy a book or send for more information will be disappointed by this omission.

Still, authors Michael Nicita and Ronald Petrusha offer incisive and often caustic comments for each book, and they don't hesitate to pan what they didn't like. Comments range from "Aside from these two chapters, this book never rises above the level of the author's previous fiasco..." (p. 40) to "...the (author's) practice of bombarding the novice with all and sundry Fortran statements will quickly cause the reader to do something sensible—like throw the book away..." (p. 243) to "Whether the user simply desires a reference to Basic statements or a guide to conversions among Basic dialects, this is the finest work available..." (p. 132).

Each book also gets a rating (from 10 to 100), although the comments are much more helpful than assigned numerical ratings.

The truly wide range of information is

good or bad, depending on your own point of view. If you're interested just in Apple business products, there are only a few books listed (probably because there are only a few available).

If your interests are more diverse and include, say, programming, there are many more books reviewed.

If you're interested in the wide spectrum of products from IBM to Timex, from Basic to Pascal, *The Guide* covers all the bases. There's even a special section on VisiCalc, along with one on word processing.

The wide variety of titles, however, also means you have to buy information on systems and languages you might not be interested in; since coverage is so wide, you get data on the whole range of subjects whether you want it or not.

Surprisingly, though, because this 409-page book is so well-done, you'll find that you'll want to read about things you never knew you were interested in.

Indexes include an alphabetical index by title, an index by author, a subject index and a list based on *The Guide's* ratings, so you can look up the best and the worst.

Four books, incidentally, received ratings of 100: *8086/8088 16-Bit Microprocessor Primer* (Byte); *The Basic Handbook—Encyclopedia of the Basic Computer Language* (CompuSoft); *32 Basic Programs for the Apple Computer* (dillithium); and *Basic Faster and Better & Other Mysteries* (IJG).

Three books were slapped with the lowest rating, 10: *Instant Freeze-Dried Computer Programming in Basic* (dillithium); *Pocket Computer Programming Made Easy* (ARC Soft); and *Sixty Challenging Problems with Basic Solutions* (Hayden).

Nicita and Petrusha also include a model inventory with retail prices—"for computer and bookstore managers interested in starting or expanding a microcomputer book section." Perhaps someone at Waldenbooks would take their advice, but I kind of doubt it; it seems out of place here.

I've reviewed some of the books included in *The Guide*, and while I don't always agree with their evaluations, the comments generally seem fair and accurate.

My only real criticism of *The Guide* (beside its wide range, if your interests are truly limited) is that a few books aren't included. Notable in their absence are *Apple Basic for Business for the Apple II*, *Annotated Basic*, *The Encyclopedia for the TRS-80 and Apple II Computer Graphics*. Also, there are no books listed on Texas Instruments' TI-99—are there no books on this one?

Thankfully, though, most of the latest additions to bookstore shelves are included and reviewed. To tell you the truth, I wish I'd thought of this book. It's well-written, complete, witty and intelligent.

If you spend any money at all on microcomputer books, spend \$9.95 for this one; it'll pay you back quickly.

Greg Glau
Prescott, AZ

How to Solve It By Computer

R.G. Dromey
Prentice-Hall, 1982
Englewood Cliffs, NJ 07632
Softcover, 442 pp., \$16.95

Are creative problem-solvers born or made?

The University of Wollongong's R.G. Dromey, building on George Polya's work in mathematics, believes that problem-solving—at least in the computer context—is a learnable skill. I agree; anyone who masters *How to Solve It by Computer* must surely become a superior programmer.

This stimulating volume is, minimally, a handy collection of 57 fundamental algorithms grouped by problem similarity and ranging from easy computations, such as the sine function and the Fibo-

nacci sequence, to more complex algorithms requiring, say, dynamic data structures or recursive routines.

The algorithms have been selected to illustrate principles of good programming design. Pascal is the language of implementation, and the book will probably be used to supplement an introductory Pascal text in college courses.

But you need not know Pascal to profit from Dromey's work. In the first place, Pascal code is readable even to the uninitiated; a Pascal manual would be a useful adjunct, but you can probably get by without one.

Furthermore, the algorithm descriptions are usually so clear that you could easily implement them in your preferred language.

Finally, the real value of the book lies in the algorithms' development; here you watch a programmer think his way through a problem, from initial ideas through false starts and unsatisfactory solutions to the formulation of the final, most efficient algorithm.

The author's style—he seems to invent these algorithms before the reader's eyes—is something of a sham, but it's also good pedagogy.

Dromey's method can be sampled by looking at his development of the fastest searching algorithm—hash searching.

You're first introduced to the searching problem via a lengthy development and analysis of the other searching routines. Then you're confronted with the (apparently) startling assertion that there exists an algorithm that requires, on average, inspection of only one or two items before you find the desired item.

How can this be? asks the author. After some thinking out loud, he concludes that since all that is known about an item is its value, the only way to achieve such a rapid search termination is for this value and its array location to be the same number.

Before you can enjoy this clever idea, Dromey puts forth a series of seemingly fatal objections. Then he proceeds—meticulously—to overcome them.

For example, suppose a small set of seven-digit telephone numbers was being searched. The suggested retrieval principle would require a huge amount of (mostly wasted) storage. How can the programmer avoid this result? By trying to answer such questions before the author does, the reader can participate in algorithm discovery and development.

Algorithm efficiency is a recurrent theme. Quantitative and qualitative standards are suggested, but the efficiency problem sometimes defies easy solutions.

For instance, while the bubblesort algorithm is generally the least efficient of sorts, when the data is almost in sorted order, it actually performs best. This realization leads to the general rule that no sorting algorithm is best for all applica-

tions.

Some of the more stimulating algorithms are left as exercises for the reader. Contrary to the practice of most texts, where at least half of the answers are given, none are supplied here.

Also lacking are sample outputs, which would be useful in understanding and verifying the algorithms. And there are the inevitable typos in the program listings.

So the book is less valuable than it could have been, particularly if you're studying on your own. However, each chapter is well-documented, making it easier for you to find help elsewhere.

The algorithms presented, of course, aren't original; they can generally be found in standard works, such as those of N. Wirth or of D.E. Knuth, or in journal literature; many are available in other introductory texts. But they're more accessible here.

Allan Blackman
New York, NY

So You Are Thinking About A Small Business Computer

R.G. Canning and N.C. Leeper
Prentice-Hall, Inc., 1982
Spectrum Books Division
Englewood Cliffs, NJ 07632
Softcover, 203 pp., \$10.95

So You Are Thinking About a Small Business Computer should be put on the "must read" list for anyone anticipating the purchase of a micro for his business. The cover bills it as "an authoritative sourcebook with answers to the tough questions about hardware/software selection, applications and implementation."

I must admit to having been skeptical about those claims, but my skepticism soon vanished because the authors actually achieve their goal.

R.G. Canning and N.C. Leeper have gone a long way in providing the background information necessary for an individual to become computer-literate. But more than that, the authors have produced a road map for the potential computer buyer as he goes through the process of evaluating his computer needs and selecting the right computer for the job.

Although the use of an experienced consultant is recommended, the time (and resulting consulting fees) that might have been spent having the consultant serve as tutor can be saved through careful study of the material presented in this book.

Canning and Leeper devote an entire chapter to "Using a Consultant," and provide a strong case for employing a consultant's services. This chapter goes into the selection and effective use of a

consultant, and ends with two case studies.

As for general education, the first four chapters provide the background that any person dealing with microcomputers ought to have.

The first chapter, "How a Computer Can Help You," itemizes the areas in which a small computer can be of use in a business and attempts to alleviate latent fears that a neophyte might have. The authors bring out the fact that, no matter what use you presently have in mind for your computer, before long you will be using that computer for applications that had never before crossed your mind.

I disagree with the authors' comment that "with computers, as with most other things, in general you get what you pay for." I've dealt with businesses that have spent \$15,000–\$30,000 for computer equipment that is neither better nor more reliable than equivalent equipment in the \$7000–\$20,000 range.

Experiences such as this should be used to emphasize the need for a knowledgeable consultant.

The next two chapters deal with the component parts of the computer and the specific types of hardware available from the more popular manufacturers, including a survey of prices that is, in this extremely competitive and changing field, surprisingly up to date.

In addition, 31 manufacturers are listed, along with brief descriptions of their systems and price ranges (in Appendix D).

It would have been beyond the scope of the book to have included more vendors, particularly when they number more than 100. I was surprised, though, to note that a company like Southwest Technical Products Corp. had been omitted while several companies marketing products not nearly so applicable to the business market were included.

Chapter 4 deals with software and is, in my opinion, the weakest part of the book. For one thing, the subject itself is too complex and varied to be dealt with significantly in a single chapter. Indeed, an entire book written as a sequel to this book would probably be necessary to do justice to the subject.

The role of good documentation is only briefly mentioned in this chapter, and it's not until chapter 8 that its importance is emphasized. To the book's credit is the description of CP/M and the advantages this system has for the businessman/computer owner.

With basic computer literacy out of the way, the book forges ahead into considerations to be taken into account in the selection of the right computer for the reader's business. Multiuser systems and networking are dealt with briefly, and chapter 5 includes three specific examples that involve making rough estimates that relate the size of the computer system to the data processing time re-

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quired by the office.

Appendix B offers 12 checklists that, when properly filled in and interpreted with the aid of the text, can help determine the computer's specifications for a given office environment.

Chapters 8 and 9 get down to the nuts and bolts of finding the right computer to purchase. Although much of the advice presented in these chapters is plain common sense, it's surprising how frequently common sense is neglected when a company decides to buy a computer.

Finally, chapter 10, "If Custom Programming Is Needed," details how to go about getting a well-designed, workable program written for your application. Several problem areas are clearly spelled out in this chapter and should be carefully heeded to avoid the single most prevalent problem in the computer industry—namely, software failure.

The authors conclude with two chapters detailing the use and selection of word processing software and a chapter on other applications, such as electronic spreadsheets, telephone communications capabilities and national network services such as the Source.

If you're considering the purchase of a computer for your business and don't know where to begin, your first \$11 should be spent on this book. In addition to the text, it includes a glossary of terms common to the microcomputer world, a list of sources for supplies and information and an index.

These features make this book a valuable reference even after your computer has been installed and is running smoothly. In fact, you may want to dust off *So You Are Thinking About a Small Business Computer* in two or three years when you get ready to buy your next computer.

Dan Bishop
 Buena Vista, CO

Income from Your Home Computer

Edward J. Lias
 Reston, 1983
 11480 Sunset Hills Road
 Reston, VA 22090
 Softcover, 161 pp., \$12.95
 Hardcover, \$17.95

Every so often you'll encounter a book that's not worth the paper on which it's printed. *Income from Your Home Computer* is such a book; its price is far out of proportion to its value.

It's not that author Edward J. Lias has written anything bad. It's just that the book's premise is weak, beginning with the cover illustration, which equates your microcomputer with a pot of gold at the end of a rainbow.

There's a curious mixture of themes here. On one hand, it's Lias' message

that fantastic opportunities exist now that you have this device. On the other hand, the message is that you have now spent all of this money, and your wife or husband has laid down the law that you'd better find a way for the machine to pay for itself.

Insofar as the latter is concerned, you might as well forget it. If you're looking for a way to cover the cost of a foolish purchase, you never will. Computer people learn early that knowledge of the computer is of no value without the knowledge of the business to which the computer is applied.

Lias presents 30 money options, two-thirds of which are nearly impossible for the average person to do.

This book's premise is weak, beginning with the cover illustration, which equates your microcomputer with a pot of gold at the end of a rainbow.

Are you prepared to invest the kind of money necessary to market a seminar on microcomputers? Consider that it costs nearly 11 cents in postage for each mailing piece sent to individuals on a mailing list you'd have to rent at another 6 cents per name since direct mail campaigns are less than one percent effective, your cost for mailing 10,000 pieces would exceed \$2,500 per experience.

It would cost a few hundred dollars to have the mailing piece designed, and you'd need money to advertise the seminar in other areas, rental fees for hotel services and on and on. And it's not a one-shot deal. National exposure—even regional exposure—isn't inexpensive, but it must be done multiple times if you are to do it successfully.

Lias isn't in touch with the real world—or assumes that his audience is grossly naive. There isn't a library around that will spend \$2000 to purchase a coin-operated table to which to attach the \$500, \$1000 or even \$3000 computer you wish to rent to them. If they get the computer at all, they'll want their own.

I don't wish to knock all of Lias' ideas. I'm even doing one of them right now—writing a magazine article, and I do use the word processing services of my microcomputer for other reasons. The amount of time it takes to break into print with anything other than a random article is no small consideration.

Yes, you can do some bookkeeping for your neighbors. You can do some typing for the local college students. You can be as competitive as any typing service in that regard.

Chances are, however, that the inexpensive matrix printer you obtained with your system won't do for submission of the term paper. Letter-quality printers of any capability are not inexpensive.

"Start a computer store," Lias says. Good idea. Franchise, store facility, staff, inventory, taxes, pilferage, maintenance, damages and so on are not for the faint-of-heart.

Sell your broken machine for parts. Good idea. A little counter-productive, but a good idea, nonetheless. With all of the new machines coming out, the need for repair is extreme. And most of what goes into these machines can be obtained for a few dollars. Don't plan on a pot of gold from that.

A few of these ideas do have some business value, but for part-time at the most.

The amount of original and creative writing in this book is small. Most of it is information that has been culled or clipped from the same publications you may subscribe to. Some of those have simply been reproduced in the book.

However, Lias does provide one piece of advice that comes close to the cover illustration for those of you who probably shouldn't have invested in the microcomputer in the first place. It's Money Option 17: "Sell Your Microcomputer Outright."

Ken Lord
Winchendon, MA

Making Money with Your Microcomputer

Robert J. Traister and Rich Ingram
Tab, 1982
Blue Ridge Summit, PA 17214
Paperback, 160 pp., \$7.95
Hardcover, \$13.95

So you want to make money with your microcomputer? I bet this thought has crossed many a hobbyist's mind just after that \$1000-\$4000 initial investment in a complete home computer system with two disk drives, a printer and all the memory it can hold. There must be a reason for buying the system besides playing Pac-Man or Robot Attack.

Sure, games are fun, but that doesn't justify buying something that you'll only play games on, or maybe keep track of your household expenses. So you ask yourself this question: How can I make

money with my computer?

Well, I'm glad you asked that question because you may not have to look far to get an answer. But I'll be straight with you, right from the beginning.

This is going to be a book review of *Making Money with Your Microcomputer*, but I should tell you that it probably won't help you make much money, if any at all, with your computer.

The back cover mentions that this book offers some 33 practical and proven ways to use your computer in "your own profitable full- or part-time business."

33 Ways

Yes, folks, there are 33 ways to make money with your microcomputer, this book proclaims. A quick glance at the contents gives you an overview of what you're in store for.

First of all, these 33 ideas are 33 programs (or program packages) that you may purchase from suggested sources in the book. So, really, the ideas are just recommendations to buy programs, and the text is just a favorable review of those products. That's what it looks like to me.

Well, I can read reviews in magazines for free at the library. But just for the record, let's take a look at the first of the authors' ideas. It's called "Intoxitron." Huh?

Intoxitron is a program from a company (I won't mention the name) designed to estimate the percentage of alcohol in someone's blood. The authors suggest that you sell your services to law offices, which would deal with clients arrested for drunk driving. The program would be used by lawyers to help win their clients' cases by comparing the police record of blood alcohol content with the results calculated from data taken from the client (for example, his weight, the number of drinks he's had and time between drinks). It prints out a chart of percent blood alcohol, for the lawyer to use in preparing his case.

I was all ready to look around for some unsuspecting investor for this new project, when I read on in the section. The authors say that the idea would be great fun at parties or other social gatherings. . . .

A few ideas do have some business value, but for part-time at the most, like inventory management, direct mail advertising or mailing lists. And that's stretching it, because these services require expensive computers to do any good; a VIC-20 with 5K just won't do it.

Most of the so-called money-making ideas, like computing bowling statistics and biorhythms and managing a service for lost pets, are ridiculous. In fact, most of these ideas, and hundreds more, may be found by reading ads in computer magazines.

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W. Bloomfield, MI

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All products shipped with comprehensive documentation. Call our user hotline 617-283-7719 or write for information: Gloucester Computer, 1 Blackburn Center, Gloucester, MA 01930.

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The Egyptian Management Information Center, 93 Kasr Eleiny St., Cairo Egypt, phone 27525, telex 92185, Hapi Un, is looking for interested manufacturers to market their hardware and software in Egypt and the Middle East. Contact Adel Fahmy, Ph.D.

For Sale: DEC computer equipment: TU 30, TU 56 tape drives, ME 10 memories (16K x 36 bits) as units, or send stamped envelope for price list of components to S. Grot, R.D. 1, Chadds Ford, PA 19317.

Overseas Call— Micromint MPX Users

An international users' club is now forming for people with Micromint MPX-16 kit computers. The group will discuss and distribute solutions to problems common to the machine and will also act as a unified voice in dealing with the manufacturer.

If you're interested, send your name, address, hardware and software information and a list of problems and solutions you have devised to Jouko Nuora, Reitmaa Engineering, Kumpulantie 1, 42-100 Jamsa, Finland. If you wish to receive a list of users and a newsletter, include two dollars with your letter.

Jackson, MI Commodore Club

The Jackson, MI, Commodore Club is looking for users of the VIC-20, Commodore-64 and PET. There's also special interest groups for Basic and machine language users.

The club meets at 7:30 on the last Thursday of every month, and they also publish a monthly newsletter. For

more information, contact club secretary Alfred Bruey, 201 South Grinnell St., Jackson, MI 49203.

PC Club In Darien, CT

The Connecticut IBM PC Users' Club holds monthly meetings at the Darien Public Library. Each meeting features a lecturer who discusses topics of current interest.

In addition, the club has a large programming library available to members at a nominal cost. There is also a Smartmodem tie-in where current club news can be obtained.

For further information about the club, contact Davis or Sherry Foulger, PO Box 291, New Canaan, CT 06840; 203-744-4002.

Osborne Enthusiasts in Ontario

An Osborne User's Group is being formed in Northwest Quebec and in North Ontario. If you're interested, contact M. Lounis at 5-313 Latulipe Est, Rouyn, Quebec, J9X 3K8.

Circle 135 on Reader Service card.

Know Thy PC!

Are you writing programs in BASIC or Pascal? The popular **Peeks 'n Pokes** has a disk with 58 programs and a 38-page manual that helps you get 'underneath the covers' of the PC. Learn how to use PEEK, POKE, INP, OUT, and DOS/BIOS function calls to do what you want, fast! Do you want to perform functions not available from BASIC or Pascal? It's all explained in the manual and demonstrated in the sample programs. Source code included!

Peeks 'n Pokes shows you how to:

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- Unprotect BASIC programs
- Scroll part or all of the screen
- Access the file directory
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Want to know more? **The Inside Track!** is a collection of advanced utilities for the PC programmer. It contains a disk with 61 programs, a 42-page manual, and a fold-out memory map that helps you get better performance from the PC. With this package you can give your programs assembler-assisted speed from high-level languages, get control over memory, customize and control the PC, and more. Some programs require DOS 2.00. Source code included!

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- Reserve memory for your use
- Copy memory to another location
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- Load large programs faster
- Control the keyboard settings
- And much more... for only \$45.00



MasterCard and VISA accepted. Shipping charges: \$2.50 per order for UPS; \$2.50 per item for First Class Mail to USA and Canada; \$6.00 per item for Air Mail outside USA and Canada. Dealer inquiries invited.

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MetaBasic: A Language for IBM and Apple DataBase Decisions Takes the Inside Track Manage Your Property with IBM and MCS South Bay's Money-Making Package

MetaBasic

Software 128 introduces its new software MetaBasic, a comprehensive precompiler for the Basic programming language.

MetaBasic allows large Basic programs to be developed in a modular fashion. That is, programs written in Basic may contain "real" subrou-

tine calls (not Gosubs) to other Basic program modules.

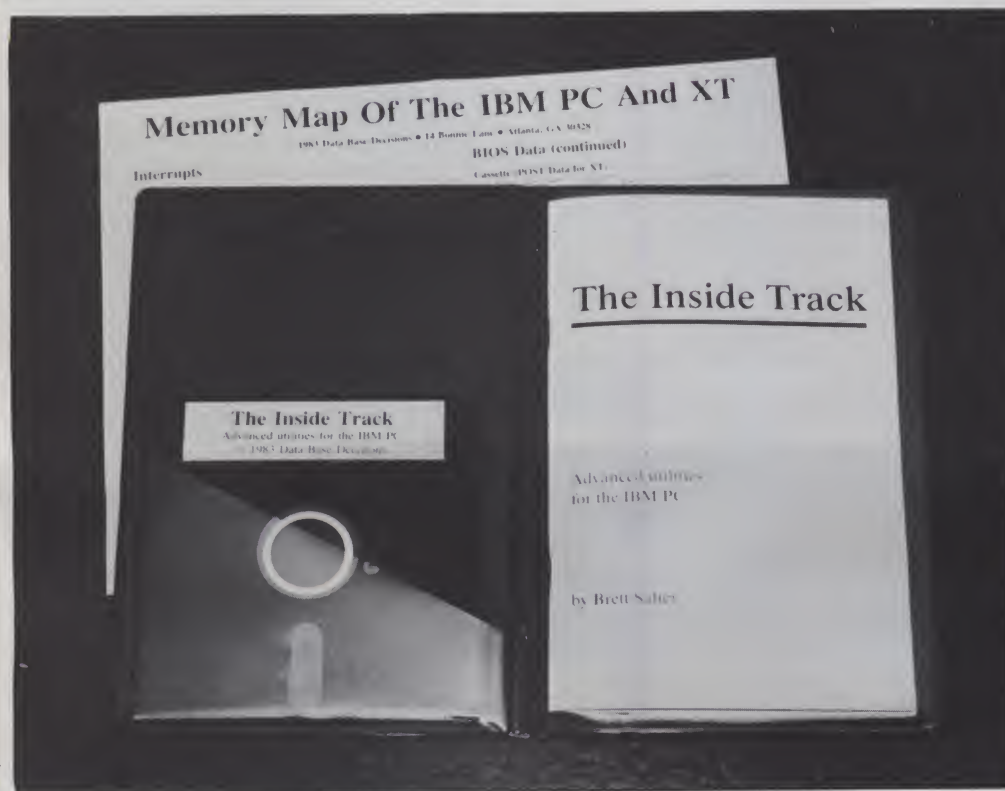
MetaBasic supports full argument passing and allows subroutines to be nested at any level. In addition to this subroutine call feature, MetaBasic supports other desirable features. These features include: enhanced data capabilities, data declaration, structured conditional program control and simplified file I/O

using record data constructs.

MetaBasic's program compression is an additional feature that allows interpretive Basic programs to be written in a structured, easy-to-read fashion. This means that programs can contain a liberal sprinkling of descriptive remarks and clarifying spaces without incurring the usual penalties of excessive file size or slower program execution.

MetaBasic automatically compresses the executable program module into an optimal form by suppressing remarks and unnecessary blanks and by reassigning abbreviated names to all program variables.

MetaBasic is available for the IBM PC (for both interpretive Basic and compiled Basic) at \$59. A version for the Apple IIe will soon be available. Software 128, 363 Walden St., Concord, MA 01742. Reader Service number 495.



The Inside Track is a collection of advanced utility programs for the IBM PC from Data Base Decisions.

The Inside Track

Data Base Decisions announces its latest software product, The Inside Track.

This software is a collection of advanced utility programs for the IBM PC. It is the sequel to Peeks 'n Pokes, which was introduced last March.

The package includes a 42-page manual, a disk with 61 programs and a fold-out memory map. It helps programmers to get better performance from, and more control over, the PC. The Inside Track is also educational—the source code for all programs is listed and there is a chapter of hints for those writing programs in assembly language.

The package gives you assembler-assisted speed via subroutines that can be called from interpretive Basic or compiled languages. The subroutines perform several func-

tions, including: read and write files as fast as DOS; display data on the screen four to ten times faster than the Basic print statement; copy memory from one location to another (useful for fast screen swapping); copy protect disks; and much more.

The Inside Track gives you more control over the PC through programs that: reserve a block of memory for use as a program scratchpad; limit the memory used by compiled Basic programs to eliminate reloading of Command.COM and to allow concurrent program loading; dynamically schedule up to four programs from within a program—even batch files (requires DOS 2.0); delay execution of a batch job for a specified time; control the keyboard; and much more.

There are even programs that turn the PC into an expensive alarm clock and programs to reboot the system in three different ways.

The system requires an IBM PC with 64K RAM (128K with DOS 2.0), PC DOS, one disk drive and an 80-column monitor. Most of the programs will run with any version of PC DOS, although a few require DOS 2.0.

The Inside Track sells for \$45 plus \$2.50 shipping. Data Base Decisions, 14 Bonnie Lane, Atlanta, GA 30328. Reader Service number 496.

Property Management System

The MCS Division of Informatics General Corp. announces new software for residential managers. This IBM-compatible property management system is an addition to the Informatics Property Pro Series.

Designed for the IBM Data-master small business computer, the residential management module tracks tenant information to help you manage properties more effectively. The system handles virtually all single and multifamily projects: apartment complexes, condominiums and single home rental properties.

The software provides property management reports, in-

cluding rent rolls, vacancy and lease expiration reports; receivables reports, such as delinquency reports and tenant accounts receivable ledgers; and administrative reports, such as rent coupons, statements, late notices and mailing labels.

Flexible property management reporting allows you to design management reports to meet specific needs. Other features of the new system include a critical data calendar, an action planning tool that helps you keep track of important dates, and a tenant inquiry feature that provides complete information on each tenant in seconds.

The residential management program costs \$2500 for the floppy disk version and \$2700 for the fixed disk. MCS Division, Informatics General Corp., PO Box 723597, Atlanta, GA 30339. Reader Service number 497.

Micros Make Money

South Bay Word Processing, Inc., has announced a new informational package that tells you how to start a small word processing service.

The Home Word Processing Service is designed for people interested in making money with their microcomputers. The kit contains a comprehensive manual, several pamphlets and software.

The software provides sample start-up, marketing and operating plans already stored on disk for the immediate start-up of a word processing service.

Home Word Processing Service sells for \$29.95 from South Bay Word Processing, 1558 Oro Vista Road, Suite 290, San Diego, CA 92154. Reader Service number 492.

TeleSolutions II

TeleVideo Systems, Inc., has introduced three new software packages for the professional PC user.

Called TeleSolutions II, the kit includes TeleWrite, a full-featured executive-level word

processing package; TeleCalc, an easy-to-use spreadsheet package; and TeleChart, an integrated graphics software package.

TeleSolutions II runs on TeleVideo's TS 803 and TS 1603 PCs.

TeleWrite is designed for first-time users. Common commands are assigned to function keys so that you can execute commands in one keystroke. TeleWrite lets you work with as many as five documents. It features split-screen capabilities and the ability to operate with all commonly used printers, such as those from Epson, NEC and Diablo.

TeleCalc is a function-key-driven modeling package for financial planning and business calculations. Its spreadsheet can contain as many as 1000 cells. Data in the spreadsheet can be altered and cells may be updated with a single command.

TeleCalc also includes a graphics extension called TeleChart, which lets you graphically display portions of the data in the spreadsheet. Pie, line and bar charts can be constructed in one keystroke and can be combined into a single display.

As with TeleCalc, TeleChart is function-key-driven and includes a help file. It supports printers and plotters, including the Epson MX-80 with graphics option, the MX-100, the FX-80 and Oki-data printers.

TeleSolutions II is available now through TeleVideo Distributors; the TS 803 sells for \$795 and the TS 1603 for

\$595. (A TS 803 computer system with TeleSolutions II software sells for \$2495 and the TS 1603 with TeleSolutions II sells for \$2995.)

TeleVideo Systems, Inc., 1170 Morse Ave., Sunnyvale, CA 94086. Reader Service number 491.

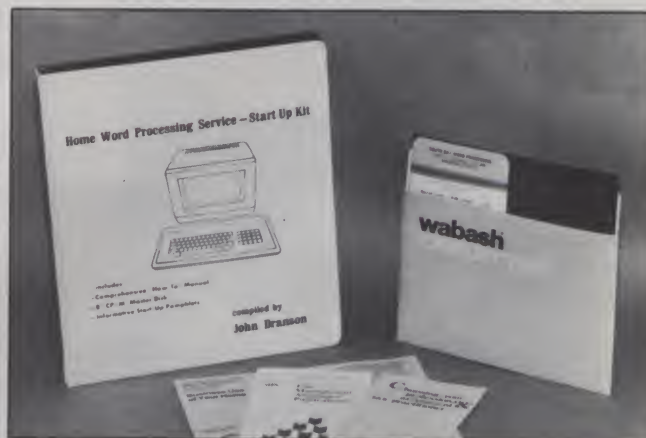
My "Type" of Apple

Gessler Educational Software's new Type-Writer transforms Apple computers into powerful, multilingual word processors.

Type-Writer lets you write and edit letters, reports and all types of text. Upper- and lowercase options are also offered in ten foreign languages—Danish, Finnish, French, German, Hawaiian, Hungarian, Italian, Norwegian, Spanish and Swedish.

In addition, Type-Writer includes a detailed, step-by-step instruction booklet. The documentation explains how to enter the text and delete or change characters, words, lines or paragraphs as well as how to search for specific sections and preview the format graphically. The program also has specially accented letters that allow you to perform all of its word processing functions in foreign languages.

Type-Writer is designed for the Apple II Plus and Apple IIe as well as any Apple-compatible computer. It sells for \$69.95 from Gessler Educational Software, 900 Broadway, New York, NY 10003. Reader Service number 490.



Home Word Processing Service is a new software package that lets you supplement your income with your micro.



Softerm 1 and 2 on Apple II provide DOS 3.3, CP/M and Pascal with file compatibility.

Two Systems, One Package

Totl.Text is a sophisticated word processing package from Microtek, Inc., for the VIC-20 and the Commodore-64.

An interface cable for parallel printers is supplied with the software. The CC-2064 2.5 is for the VIC-20 and the CC-2064 2.6 is for the C-64. These cables provide Totl.Text with a powerful word processing program for Commodore machines and allow you to create textual documents in professional formats. You can write research papers with footnotes, columnar reports and form letters.

Totl.Text has several features, including an expanded character set for the VIC printer, a full-screen editor using the VIC-20 color capability, shorthand commands and function keys for fast editing. Totl.Text allows you to pause while printing and enter up to six 80-character lines of input from the keyboard.

With limitless document lengths, Totl.Text 2.5/2.6 creates several text files on tape or disk and prints them in sequence without loss of continuity or pagination. Files created with earlier versions of Totl.Text may be loaded with this program.

The Totl.Text CC-2064 2.5 and CC-2064 2.6 both sell for \$99.50. Microtek, Inc., 4750 Viewridge Ave., San Diego, CA 92123. Reader Service number 489.

Video Tape Tracker

Video Tape Tracker is a new software product from Prosoft that quickly organizes video libraries.

Video Tape Tracker stores and manages more than 1000 titles and prints quick-reference lists by tape number and/or movie title. It can search through the list by tape, title and performer as well as print numbered title labels.

Video Tape Tracker runs on any TRS-80 Model I or III with two disk drives and 48K. It sells for \$29.95 from Prosoft, Box 560, N. Hollywood, CA 91603. Reader Service number 488.

Lowdown on dGraph

dGraph is a new graphics software package from Fox & Geller, Inc.

dGraph selects, sorts, averages and totals information from dBase II databases.

Secretaries, clerks and managers can chart the information in pie, bar and line charts. The procedure is easy with a completely menu-driven system that utilizes single-key-stroke commands for all functions.

dGraph is available in CP/M-80, MS DOS and PC DOS versions for use on most PCs. It sells for \$295 from Fox & Geller, Inc., 604 Market St., Elmwood Park, NJ 07407. Reader Service number 487.

A One and a Two And a Softerm

Softerm 1 and 2 are two terminal communication software products for the Apple II manufactured by Softronic, Inc. They provide DOS 3.3, CP/M and Pascal file compatibility in a single program on the Apple computer.

Softerm 1 operates on the Apple II, II Plus and IIe and provides basic terminal communications to a variety of host computers. Timesharing services and information services such as The Source, CompuServe and Dow Jones News Retrieval are also available.

Softerm 2 includes all features of Softerm 1 and provides an exact terminal emulation of a wide range of conversational and block mode CRT terminals such as ADDS Viewpoint, Datapoint 3601 and IBM 3101 Models 10 and 20.

Softerm 1 and 2 operate full- or half-duplex at speeds up to 9600 bps using either a direct connection or any standard manual or autodial modem.

Softerm 1 and 2 incorporate an advanced file manager that provides compatibility with DOS 3.3, CP/M and Pascal disk formats for all file operations including file transfers at speeds up to five times faster than standard Apple DOS.

Local file transfer allows files to be displayed, printed and copied to another disk in a different format, which provides complete format conversion capabilities. Numer-

ous editing options allow easy reformatting of data to accommodate the variations in host computer data formats. The file transfer methods of Softerm 1 and 2 are flexible and can match any host computer requirement.

Softerm 1 is available with a user's guide, a basic terminal emulation with user-definable functions and a two-key hardware keyboard enhancer for \$135. Softerm 2 is available with 20 exact terminal emulations of popular CRT terminals and a three-key hardware keyboard enhancer for \$195. Softronic, Inc., 6626 Prince Edward, Memphis, TN 38119. Reader Service number 485.

PortaCalc

PortaCalc is an electronic spreadsheet program from Skyline Marketing Corp.

PortaCalc features a 14-column by 26-row workspace, as well as built-in function keys. These keys give you the ability to save, print or report print. They also allow you to link behind the data in order to take a closer look at the formulas in use.

PortaCalc worksheets may be saved, loaded or merged using the computer's memory for instant recall.

Two utility programs are included with PortaCalc. PortaPrint is an enhancement to the Model 100's text editor, adding the ability to adjust left, right and top margins as well as page length. Page numbers, headers, centered



PortaCalc is an electronic spreadsheet program for the Tandy Model 100 computer from Skyline Marketing, Corp.

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A. Which microcomputing systems do you own? Check all that apply.

1. Apple II +, III ☐ 18. PASC 8081 ☐
 2. Atari 400, 800 ☐ 19. Franklin Ace ☐
 3. Atari 1300 XL ☐ 20. Gemini ☐
 4. Atari 1300 XL ☐ 21. IBM PC ☐
 5. Commodore VIC-20 ☐ 22. Texas Instruments ☐
 6. Commodore PET ☐ 23. Tandy 100 ☐
 7. Commodore 64 ☐ 24. Zenith ☐
 8. Corbino ☐ 25. Other ☐

Which of the following systems do you plan to buy during the next 12 months?

26. Apple IIe ☐ 38. Orion Altache ☐
 27. Apple IIc ☐ 39. Sanyo ☐
 28. Atari 1300 XL ☐ 40. Texas Instruments Compact ☐
 29. Commodore 64 ☐ 41. Tandy 100 ☐
 30. Commodore 64 ☐ 42. Texas Instruments Professional ☐
 31. Epson HX-20 ☐ 43. Tandy Model 16 ☐
 32. Epson HX-20 ☐ 44. Tandy Model 16 ☐
 33. Hyperion ☐ 45. Tandy Model 16 ☐
 34. IBM XT PC ☐ 46. Zenith ☐
 35. Micro Micro Decision ☐ 47. Zenith ☐
 36. Osborne Executive ☐ 48. Zenith ☐
 37. Osborne Executive ☐ 49. Other ☐

B. How much have you invested in computer hardware (including peripherals) during the last 12 months?

1. Under \$500 ☐ 2. \$500-\$1,000 ☐ 3. \$1,000-\$1,500 ☐ 4. Over \$1,500 ☐

C. How much do you plan to spend on computer hardware during the next 12 months?

1. Under \$500 ☐ 2. \$500-\$1,000 ☐ 3. \$1,000-\$1,500 ☐ 4. Over \$1,500 ☐

D. How much have you invested in computer software during the last 12 months?

1. Under \$100 ☐ 2. \$100-\$200 ☐ 3. \$200-\$500 ☐ 4. Over \$500 ☐

E. How much do you plan to spend on software during the next 12 months?

1. Under \$100 ☐ 2. \$100-\$200 ☐ 3. \$200-\$500 ☐ 4. Over \$500 ☐

F. Do you influence friends or business associates' purchases of computing equipment?

1. Yes ☐ 2. No ☐

G. What do you consider the best source of information about computers? Check one only.

1. Computer magazines ☐ 2. Seminars/courses ☐
 3. Other magazines ☐ 4. Word of mouth ☐
 5. Books ☐ 6. Other ☐

H. If you use a microcomputer at work, what is your primary application?

1. Database Management ☐ 2. Financial Accounting ☐
 3. Other Business ☐ 4. Graphics ☐
 5. Home Financial/Household ☐ 6. Hardware Design ☐
 7. Education ☐ 8. Other ☐

I. For the most part, the articles in Microcomputing are

1. Too simple ☐ 2. Too complex ☐ 3. Just right ☐

L. Which of the following columns do you read? Please rate them on a scale of 1 (seldom read) to 5 (always read).

1. Publisher's Remarks ☐ 2. News ☐ 3. Classified ☐ 4. Letters ☐
 5. Product Reviews ☐ 6. Hardware ☐ 7. Software ☐ 8. Other ☐

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lines, flush right justification and new page control are also available.

PortaDex is a data exchange program that reformats PortaCalc files into the DIF format used by VisiCalc.

PortaCalc is supplied on tape and requires 24K RAM. Complete illustrated instructions and a quick reference card are also available.

The software sells for \$69.95. Skyline Marketing Corp., 4510 West Irving Park Road, Chicago, IL 60641. Reader Service number 481.

Expense Account Manager

Adaptive Software announces its new software, the Expense Account Manager. It is the first microcomputer software package specifically designed to organize and track travel and entertainment expenses for the company executive and individual professional.

Features include easy entry and corrections of expenses, reminders of expenses that are often overlooked and prompting for specific information required by the IRS and budget projections.

For individuals who must charge out their expenses by client or project, an option to provide subtotals in this fashion is included. A table lists trips that are frequently traveled in order to allow consistent reporting of automobile mileage.

The system automatically reconciles travel advances and tracks reimbursements. An interface to VisiCalc is provided to allow ad-hoc reporting of the expense data. Expense Account Manager also prints pocket recording sheets that you can use to record expenses as they are incurred.

The system is adaptive. You can readily change the definitions of the expense items, budget lines and subtotals without any computer programming.

The Expense Account Manager is available on the Apple II, II Plus and IIe. It requires 48K, one or two disk drives and a printer. The Expense Ac-

count Manager sells for \$150. Adaptive Software, 1868 Cavell Ave., Highland Park, IL 60035. Reader Service number 486.

View the Message

The Transend PC, from Transend Corp. (2190 Paragon Drive, San Jose, CA 95131), is a message-oriented communications software program for the IBM PC.

Based on an "In/Out basket" analogy, Transend PC uses icons (simple computer graphics) combined with on-screen menus to make the software very simple to learn and use.

Advanced communication software makes log-on, transmission, and log-off procedures automatic, under one-function-key control.

Transend PC also features pull-down menus and on-screen windows. Baud rates may be selected from 110-1200; up to 9600 baud is available for direct connection.

Transend PC costs \$189. Reader Service number 499.

Operating with Smal-LDOS

Smal-LDOS is a new operating system manufactured by Logical Systems, Inc. It is the most sophisticated Z-80 operating system for the TRS-80 line of microcomputer systems.

Smal-LDOS contains all of the popular LDOS commands. It includes many valuable functions, including job control language, keyboard type-ahead, and a tremendously powerful printer forms controller. An advanced version of TRS-80 Disk Basic (LBasic) is included, providing many features that are indispensable to the serious programmer or user.

Smal-LDOS is available for the TRS-80 Model I, III or 4 for \$59 (plus \$4 shipping). Logical Systems, Inc., 8970 N. 55th St., PO Box 23956, Milwaukee, WI 53223. Reader Service number 498.

Circle 235 on Reader Service card.

Commodore 64 and VIC-20

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- **BUFFERS**—Receive, Transmit, Program, and Screen
- **PRINTING**—Continuous printing with Smart ASCII interface and parallel printer; buffered printing otherwise
- **DISK SUPPORT**—Directory, Copy, Rename, Scratch

Program options are selected by menus and function keys. For maximum convenience, an EXEC file sets all options on start-up. SuperTerm may be backed-up for safety. Software on disk with special cartridge module.

Write for the full story on SuperTerm; or, if you already want that difference, order today!

Requires: Commodore 64 or VIC-20, disk drive or Datasette, and compatible modem. VIC version requires 16K memory expansion. Please specify VIC or 64 when ordering.

Smart ASCII Plus . . . \$59⁹⁵

The only interface which supports streaming — sending characters simultaneously to the screen and printer — with SuperTerm.

Also great for use with your own programs or most application programs, i.e., word processors. **Print modes:** CBM Graphics, TRANSLATE, DaisyTRANSLATE, CBM/True ASCII, and PIPELINE.

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Make Your Apple II a low-cost System RS-232 Breakout Box Transmits Data STD Microsystems on the Model 5320A Bus

Economize and Learn

Qwerty, Inc., announces QPAK-68, a new add-in board and software package that turns the Apple II into a low-cost 68000 assembly language development system.

The system is intended for engineers, researchers, programmers, consultants and people who want to economize and learn the 68000. QPAK-68 is a complete system including: a plug-in board that runs 68000 programs, a combined editor/assembler that creates 68000 source codes, a debugger for testing, and a variety of documentation and reference material that explains how the 68000 works.

The new board plugs directly into the Apple and uses the 68008, a software compatible eight-bit version of the 68000. The 68008 processor is driven from the Apple's 7.16 MHz clock so it can run parallel with the 6502. You can start,

stop or interrupt it at any time from the Apple.

What makes the QPAK-68 board unique is its ability to run directly out of the Apple's memory. It shares the Apple's full 64K memory space and can access the same memory and peripherals as the Apple's 6502, including the hi-res screen display. In addition, more than one QPAK-68 board may be inserted to run in a multiprocessor mode if desired.

The board has a local memory of 8K of EPROM and 2K of RAM, expandable to 32K respectively. An expansion connector on the top edge connects to additional local memory or to future 68000 peripherals.

The EPROM-resident debugger displays five screen windows to monitor or change registers or memory and to set breakpoints. It also includes single-step and disassembly instructions.

The source code development package comes on an

Apple-compatible disk and consists of a combined editor and macroassembler. The system is capable of quick editing and assembly of large 68000 programs.

QPAK-68, complete with Q-68 board, software, user's guide and 68000 documentation, is available now for \$695. Qwerty, Inc., 9252 Chesapeake Drive, Suite 600, San Diego, CA 92123. Reader Service number 469.

Breakout With RS-232

Datacom Northwest, Inc., announces its new RS-232 Tri-State breakout box.

The unit has 13 Tri-State LEDs, including one that monitors a spare circuit.

Two features make the breakout box unique. It has the ability to swap transmit data and receive data by setting two DIP switches. The unit can also raise the control

signal lines, clear to send, data set ready, and data carrier detect, by setting individual DIP switches.

The RS-232 Tri-State has both positive and negative EIA voltage outputs that allow you to raise or lower the state of any line. A low-battery indicator is standard.

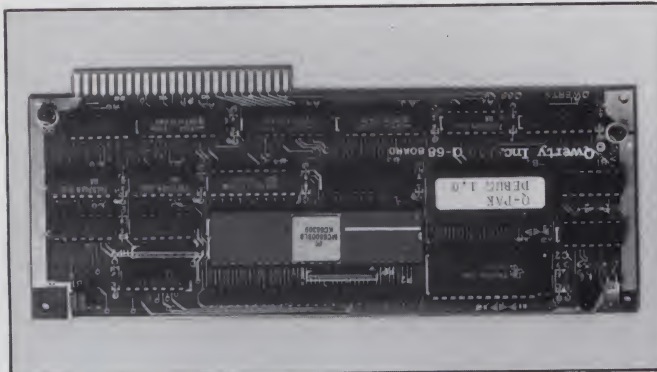
The unit is shirt-pocket sized and weighs eight ounces. It sells for \$249.

Datacom Northwest, Inc., 11300 25th Ave. N.E., Seattle, WA 98125. Reader Service number 463.

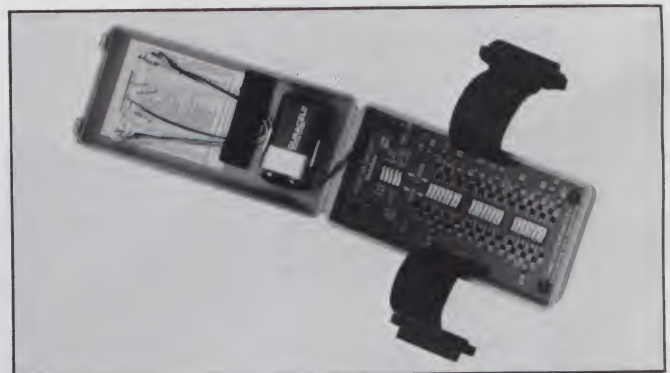
Catch the Bus

STD Microsystems introduces the Model 5320A. It is an STD Bus CPU that features a Z-80 microprocessor, an on-board counter/timer CTC and fully buffered signals for maximum expansibility.

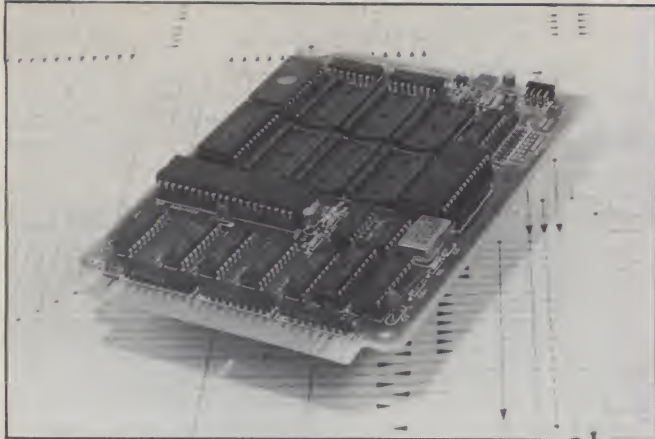
The module accepts up to 16K bytes of RAM/ROM/PROM/EPROM, which may



QPAK-68 from Qwerty, Inc., turns the Apple II into a low-cost 68000 assembly language development system.



The RS-232 Tri-State is a new breakout box by Datacom Northwest, Inc.



Model 5320A is a new STD Bus Z-80 from STD Microsystems.

freely intermix without module reconfiguration.

The STD Microsystems design allows user-modifiable control of memory and interrupt acknowledge wait states. The CTC has four channels that may be independently programmed for frequency/event counting, timing or interrupt generation. Bidirectional address, data and control buses permit DMA to on-board memory and I/O.

This full STD Bus compatibility assures efficient, cost-effective system design. It requires a +5 V supply. Model 5320A is available in 2.5 MHz for \$195, in 4.0 MHz for \$225, or in 6.0 MHz for \$255.

STD Microsystems, 399 Sherman Ave., Palo Alto, CA 94306. Reader Service number 472.

Monitor Data Transactions

The RS-232 Data Tap, from B & B Electronics, is a small compact device that allows you to monitor data being transmitted or received on any RS-232.

Three RS-232 connectors—one male and two female—allow the Data Tap to be inserted in the RS-232 line. The female connectors supplied for the tap can be used to drive a printer, a CRT or any other receive-type RS-232 device.

The main line transmit data and/or receive data can be routed to the tap connector. The tap connector is set up in the loop-back mode (similar to a null modem connector) so

that the main line handshake signals are not relied upon for proper operation.

The RS-232 Data Tap sells for \$34.95. B & B Electronics Mfg. Co., PO Box 475, Mendota, IL 61342. Reader Service number 474.

Subsystem Saves Time

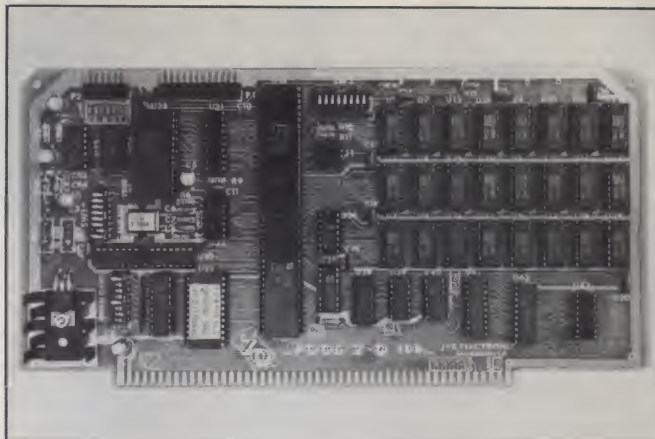
The new Accelerator II is a time-saving subsystem from Titan Technologies.

This unique board, based on a fast 6502 processor with 64K high-speed memory, allows you to speed up programs like VisiCalc, DB Master, Pie Writer, Home Accountant, Multi-Plan, Screen-Writer II, Apple Writer and Work Handler as well as games like Frogger, Zork and Wizardry.

The dramatic increase in speed improves efficiency and productivity and reduces the frustration of long delays in both business and home applications. It increases the execution time for all programs on Apple II and Apple II Plus.

The addition of Accelerator II to the Apple II creates parallel processor operations; the Apple II main board handles only the video display while the Accelerator II duplicates the 48K of the Apple and adds a fast, built-in language card. Thus, virtually all Apple II computer software can have the benefit of greater speeds. When desired, the Accelerator II will function at normal Apple II or II Plus speeds.

The Accelerator II is a plug-in board which can be used in



JVB Electronics' new Spool-Z-Q 100 expands up to 256K.

any slot. It is hardware compatible with most standard peripherals. Because most peripherals run at differing speeds (such as disk drives or modems), switches are provided to slow the speed to individual devices.

The Accelerator II sells for \$599. Titan Technologies, Inc., 310 West Ann St., Ann Arbor, MI 48104. Reader Service number 468.

Broadening Horizons With Spool-Z-Q 100 Printer Buffer

JVB Electronics introduces a new printer buffer called Spool-Z-Q 100.

It is an S-100 (IEEE-696) compatible, 256K character (maximum) hardware printer buffer. Spool-Z-Q 100 interfaces to both serial and parallel printers and has many desirable features and capabilities.

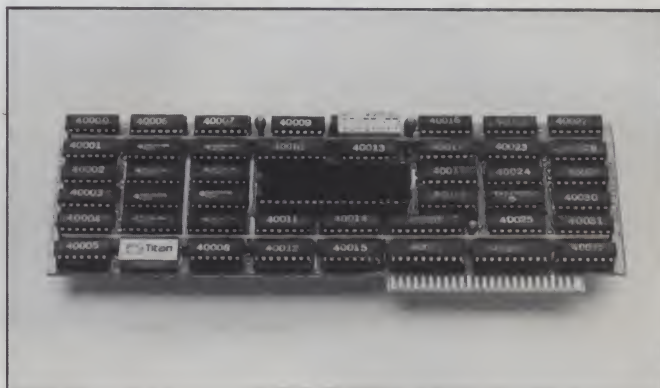
Spool-Z-Q 100 allows you to

expand to its 256K maximum by plugging in standard 4164 64K RAM chips. Other size chips available are 32K, 64K, 128K and 192K. Sockets for the full 256K are installed on each Spool-Z-Q 100.

Spool-Z-Q 100 interfaces to most printers. Baud rates, parity and word length are switch selectable for the serial interface. The board supports several protocols, including XON/XOFF, ETX/ACK, ENQ/ACK and reverse channel in either polarity.

The system's on-board processor frees your computer and shrinks your BIOS. It also ignores the reset signals on the S-100 bus (although they may be jumper enabled) so that even if your computer has a program crash, Spool-Z-Q 100 will continue printing queued documents.

Spool-Z-Q 100 has a socket installed for an optional switch panel that allows you to control the copy, clear the buffer and self-test the functions. Also, two modes, nor-



Titan Technologies' Accelerator II is a new time-saving subsystem.

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mal and pause-on-form feed, allow for both normal and special buffered printing.

Spool-Z-Q 100 sells for \$319 with 32K, \$349 with 64K, \$409 with 128K, \$469 with 192K and \$529 with 256K. JVB Electronics, 1601 Fulton Ave., Suite 10A, Sacramento, CA 95825. Reader Service number 465.

Prevent Multi-user Conflict on Your Database

American Planning Corp. announces a new database management system for PC/NET. This multi-user system, called MIS Builder, automatically prevents user conflict without programming.

MIS Builder is a business-oriented database management system. It integrates a sophisticated menu-driven database manager with an automated program development system.

It handles business-oriented data files of up to 80,000 records. Sorting is rarely needed because MIS Builder automatically updates all indexes (up to 15) when changes are made. There is a full-featured report program generator for sophisticated business reports. First-time users can construct simple inquiries with totals and subtotals by selecting from menu options.

When used for developing programs, MIS Builder reduces at least 60 percent of the cost and up to 95 percent of the time. The modularized concepts of MIS Builder allow inexperienced programmers to create unique applications software, while providing professional programmers with advanced software development tools.

MIS Builder has several automated and semiauto-

mated modes. The automated mode is designed for non-programmers, providing a foundation module which defines individual data files and an inquiry function that designs and produces video pages. It also has a report generator that performs sophisticated calculations and produces output to the display screen, printer or other files using its fast sort capability.

The semiautomated mode has a broad and varied set of functions that supplement the capabilities of the automated mode. Typically, large and complex programs created in the semiautomated mode are made up of 75 percent automated code and 25 percent new code.

MIS Builder is available for the IBM PC and business machine microprocessors including the Z-80 and 8086/8. It also supports most operating systems such as CP/M, CP/M-86, MP/M, MP/M-86, MS DOS, North Star DOS, Advantage GDOS and others.

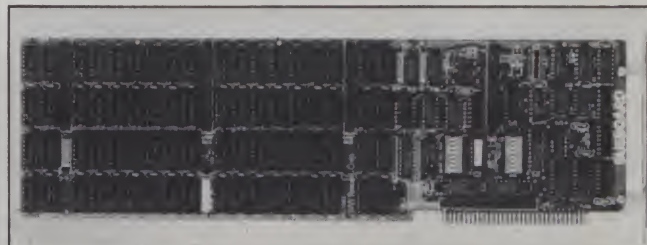
MIS Builder costs \$495 and the advanced programmers' function package costs an additional \$295. American Planning Corp., 4600 Duke St., Suite 423, Alexandria, VA 22304. Reader Service number 462.

Expand on Busboard

The LNW Busboard is an innovative multifunction card for the IBM PC and XT manufactured by LNW Computers.

The Busboard is modular in design and can hold up to eight separate modules per board. It can be customized to your changing needs. As new functions become available, modules will be designed that can easily be added or subtracted to the main board.

The Busboard comes com-



The Busboard, from LNW Computers, solves the IBM PC and XT expansion problem with eight modules.

plete with 64K of parity-checking RAM and can be used for slave, multi- or compatible processing. It is expandable to 512K RAM in 64K plug-in increments. The Busboard also features Busdrive, a high-performance disk drive emulator, and Spoolbus, a queuing spooler for more than one printer.

The Busboard retails for \$349.95. The I/O Busboard is also available with no provisions for RAM or coprocessing modules for \$129.95.

LNW Computers, 2620 Walnut St., Tustin, CA 92680. Reader Service number 475.

A Module With Compatibility

Connecticut microComputer, Inc., announces a new 16-channel analog input module. The Busster D16 is a self-contained IEEE-488 (GPIB) bus-compatible device.

The D16 is the fourth product in the Busster series of I/O modules. It works with any microcomputer that has an IEEE-488 interface (either built in or added on). It is compatible with computers manufactured by Apple, IBM, Commodore, Osborne, Hewlett-Packard and Tektronix.

The Busster D16 analog input module accepts commands from any host computer through its IEEE port in order to read data or activate the timer and buffer. The data is converted to eight bits and the conversion time is less than 100 microseconds.

The built-in timer operates from .01 seconds to 48 hours. The built-in buffer allows for data acquisition while the host computer is tied up. The Busster module economically increases a computer's interfacing capability while reducing its workload.

The Busster D16 analog input module is easily programmed through Basic commands from the controlling computer.

The Busster D16 sells for \$495. Connecticut microComputer, Inc., 36 Del Mar Drive, Brookfield, CT 06804. Reader Service number 467.

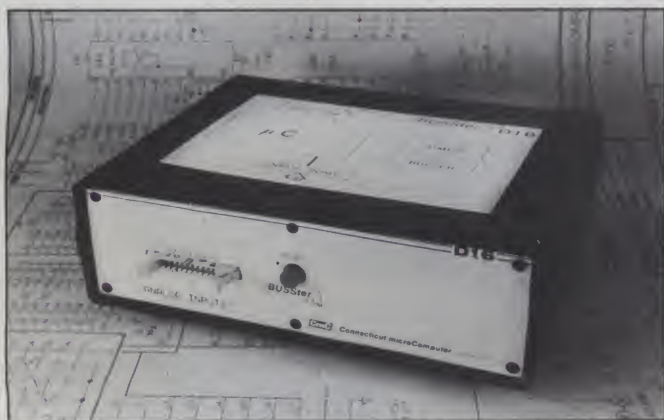
Versatility With Apple III Hard Disk System

Mountain Computer, Inc., announces the first hard disk system for the Apple III which runs both Apple III and Apple II software.

In addition to having the highest memory capacity (at 20M), the system is marketed to be the most versatile Apple II hard disk system available.

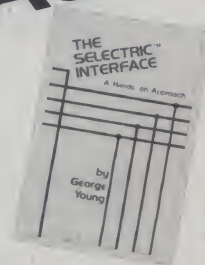
The Mountain Apple III Hard Disk System benefits CPAs, attorneys, educational administrators, systems integrators and small medical clinics and businesses. It allows you to enter and maintain files in either Apple II or Apple III modes without additional patching.

The Apple III system also accepts both Apple SOS and CPM software. With concurrent storage, Apple II users



Connecticut microComputer's Busster D16 is a new 16-channel analog input module.

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may extend the life of their software. It also lets you thoroughly investigate Apple III software purchases in order to make a gradual entry into the more sophisticated Apple III applications packages.

The Apple III hard disk system is available in four storage capacities—5M, 10M, 15M and 20M.

In addition, the Mountain Hard Disk System features four user-visible partitions that act as user-definable volumes on each disk and allow faster access times than sub-directories.

The Mountain Apple III Hard Disk System retails for \$1995 for 5M, \$2495 for 10M, \$2995 for 15M and \$3495 for 20M. Hard disk systems are also available for the IBM PC and XT and Apple II and Ie and Franklin PCs.

Mountain Computer, Inc., 300 El Pueblo Road, Scotts Valley, CA 95066. Reader Service number 471.

The 68000 Multibus CPU and Local Memory Board

Callan Data Systems introduces the CD68K Microprocessor Systems board. The board features I/O and memory enhancements of the Stanford "Sun" family of 68000 Multibus IEEE 796 single board computers.

By partitioning CPU and I/O

functions on one board with local memory on the second, the design eliminates wait states without the needless replication of memory control logic.

Up to two one megabyte local memory boards can be used per board. It has two-level, memory management architecture with separate segment and page maps as well as a context selection register.

The system permits mapping of up to 16 process contexts.

The Callan CD68K sells for \$1450. Callan Data Systems, 2637 Townsgate Road, Westlake Village, CA 91361. Reader Service number 461.

Time for P-Series

Adaptive Data & Energy Systems announces a new ST 506 Winchester disk controller. It is designed as a single card interface between the IBM PC I/O bus and the 5¼-inch Winchester disk interface.

Called the P-Series Disk Controller, it emulates the IBM PC disk controller instruction set while taking full advantage of the existing software base through its compatibility with PC DOS 2.0.

The controller utilizes custom LSI technology and an on-board, high performance microprocessor. It provides

emulation of the IBM controller while providing significant growth potential for nonIBM-defined commands.

Additional features include an IBM PC expansion board form factor; IBM PC I/O channel plug compatibility; multiple-sector read/write operations; and consecutive physical-sector operations.

Each P-Series disk controller supports two ST 506 Winchester disk drives. It also includes error detection with eight-bit error correction, 512 byte sector sizes and user-programmable interleaving. The controller has an on-board socket and decoding for an eight-byte boot EPROM.

The P-Series Disk Controller sells for \$395. Adaptive Data & Energy Systems, 2627 Pomona Blvd., Pomona, CA 91768. Reader Service number 473.

Managing Your Modem

Digital Pathways introduces Defender II, a dial-up system for computer access control and management.

Computer access control via dial-up lines is a critical factor in telecommunications because of the proliferation of home computers and sophisticated modems which expand the possibility of unauthorized database entry.

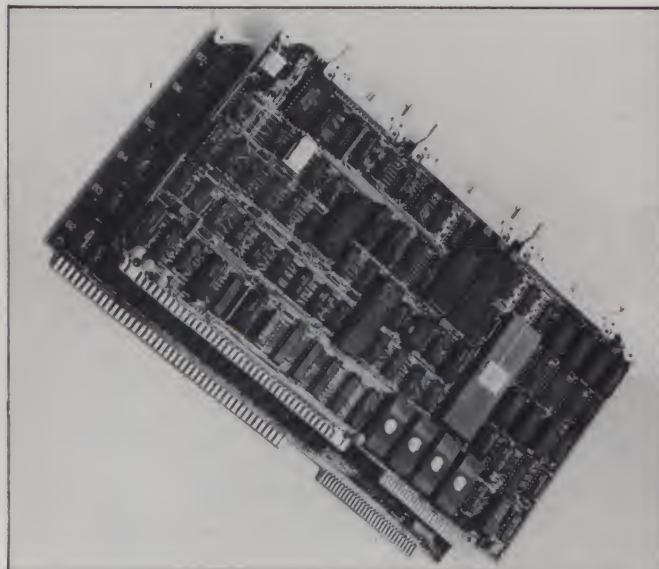
Defender II guards against unauthorized usage by providing an automated dial-in/call-back procedure allowing access only through authorized telephones.

In addition, Defender II provides a host of sophisticated management, diagnostic and network control features. These include a complete audit trail of all transactions, low-cost telephone routing, prioritized queuing, status reporting on all modems and preventative diagnostic procedures. Another feature of Defender II is its ability to send computer-independent messages to a predefined list of phone numbers.

Defender II is based upon Digital Pathways' proprietary bus-controlled 212A modems. Up to 48 of these modems are packaged in each compact 19-inch high rack-mounting cabinet with full Intel multibus modularity.

The system's high degree of modularity allows for removal and/or replacement of any board in the cabinet without disrupting on-going communications.

Defender II supports more than 1000 users with unlimited expandability through the use of additional memory boards. A typical 48-modem system costs about \$800 per line. Adapters are available for other modems at \$200 per



The CD68K is a microprocessor systems board from Callan Data Systems.



Digital Pathways' Defender II provides intelligent management of central-site, dial-up modem systems.

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line.

Digital Pathways, 1060 East Meadow Circle, Palo Alto, CA 94303. Reader Service number 466.

A Modem and Software For Data Communications

Cermetek Microelectronics, Inc., announces a new Bell 212A-type modem that plugs directly into the IBM PC, XT, or IBM-compatible PCs such as the Eagle, Columbia, Compaq or Corona.

Cermetek's Info-Mate 212PC is supplied with a data communication software package called Modemate.

This software allows PC users to transmit and receive files; to auto-dial data or voice calls; to receive or transmit information at full or half-duplex; to log modem data on a printer; and to maintain a 60-entry phone book.

The Info-Mate 212PC provides asynchronous data communications at either 110, 300 or 1200 bps. It also supports automatic dialing, answering, speed selecting, parity selecting, auto selection of tone and pulse dialing. The Info-Mate 212PC also supports electronic detection of dial, busy, ring-back and modem answer tone as well as detection of the human voice.

The minimum PC required to operate the Info-Mate 212PC and the Modemate software is either an IBM PC, XT or compatible system, a

PC DOS 1.1 or 2.0, 64K RAM, one disk drive, and an 80-column display.

The Info-Mate 212PC and its accompanying Modemate software cost \$495. Cermetek Microelectronics, Inc., 1308 Borregas Ave., Sunnyvale, CA 94089. Reader Service number 460.

Interface Board Runs CP/M Software On DEC

The QCP-11 is a new plug-in interface board from Logcraft, Inc.

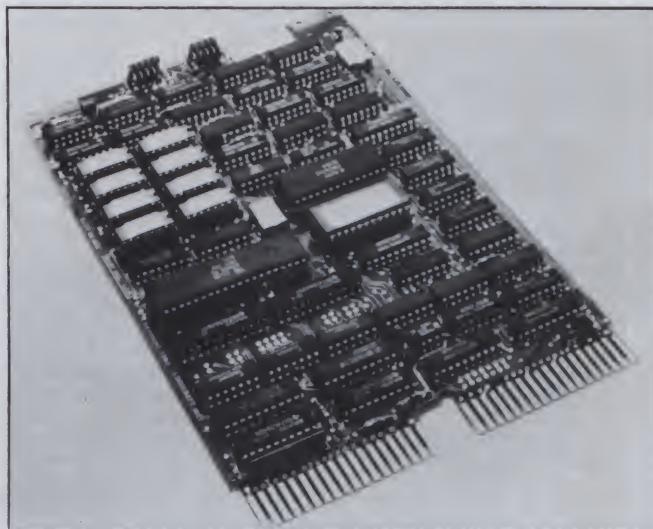
The QCP-11 allows CP/M software on DEC LSI-11 computers to run simultaneously with other programs. A serial port lets a modem, terminal or printer connect directly to the board.

The QCP-11 contains 64K RAM, 2K PROM and a Z-80B microprocessor at 6 MHz with no wait states. It is compatible with RT-11, RSX11M/M-Plus, TSX-Plus and RSTS/E operating systems and runs independently of the system.

The Logcraft QCP-11 costs \$1495. Logcraft, Inc., 3 Graham Drive, Nashua, NH 03061. Reader Service number 470.

Share Business Data

The Database Machine is a new plug-in device for the IBM PC which allows many desktop microcomputers to share access to the same corporate



The QCP-11 is a plug-in interface board from Logcraft, Inc.

information pool.

Manufactured by Cogent Data Technologies, Inc., it acts as an intelligent, high-speed controller for the new breed of small, inexpensive Winchester hard disks. In effect, it is a traffic director, sorting requests from micros on the network, providing database programs from special circuits, accessing the hard disk and sending the information back to the inquiring microcomputer.

On the user's end, waiting time is minimal even if a hundred coworkers all want the same client address, inventory figure or cost projection at the same time.

The Database Machine is installed in a PC with hard disk connections and with connections to networks that link to other PCs within the office or building.

The Database Machine lets your microcomputer retain its autonomy while adding to and benefitting from a distributed database. It retails for \$1300-\$1500 depending on configuration and quantity.

Cogent Data Technologies, Inc., PO Box 3902, Bellevue,

WA 98009. Reader Service number 476.

Cover the Distance With Half the Drive

Wholesale Technology, Inc., announces its new Half Track disk drive for Apple Computers.

The Half Track disk drive is a 5¼-inch floppy drive that stands only 41 millimeters high and provides 160K of dual-density storage. It is fully compatible with Apple II, II Plus and IIe and runs on DOS 3.2 or 3.3.

The Half Track disk drive features contemporary slim-line styling, cooling louvers, auto-eject of disks for operator convenience, a unique quick-release controller cable and a fast 12 millisecond head access time.

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Wholesale Technology, Inc., 1530 South Sinclair, Anaheim, CA 92806. Reader Service number 464.

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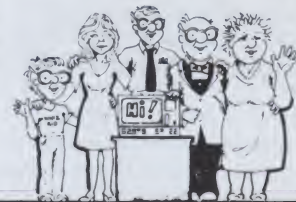
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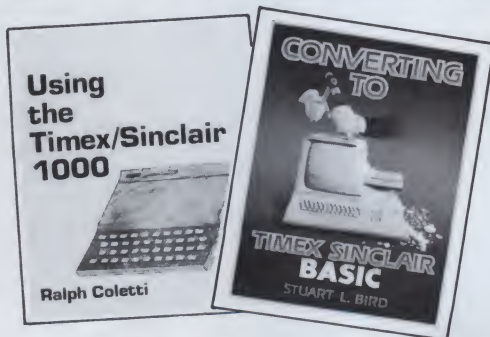
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REVIEWS

(From p. 146)

the major areas of importance.

The Internal Rate of Return is, as you may expect, the most important. This indicates the return on your invested capital as a percentage of your investment. A useful feature rests in the fact that the internal rate of return is shown for each of the 20 years of the study. This makes it possible, by inspection, to determine when there is a downturn and when it's time to sell.

Also of importance is the information on the tax consequences shown as depreciation, interest expense, capital gains tax (if sold) and the effect of your tax bracket on the income you are to receive. This can help the individual investor determine the tax consequence of the proposed investment situation.

Another area with clout is, of course, key income from the property because it helps determine the income you can expect to receive in order to supplement your income or reinvest it.

Total investment, including original investment, capital improvements and anticipated appreciation of the property value,

is also a major area.

The financial specialist pointed out that the full 20-year projection of all factors given can be of great value in determining the correct point to sale for your investment.

Even after you have purchased the real estate, access to the model and the printed report will still be valuable. As the present progresses to the future, it will be valuable to rerun the model every year as the assumptions made in the purchase of the property change.

REAP offers a wealth of information to the person knowledgeable in real estate, taxes, investments and accounting. Given the REAP information and the right know-how, a person can derive a good analysis of the potentials of a real estate investment.

The REAP's information is based on assumptions and educated guesses about what will happen in the future.

The ability and knowledge needed to answer the questions that the model uses are not available to novices or semiprofessionals. Most people just don't know what an internal rate of return is; what the Rule of 78 is and how it is used; what the five IRS-accepted methods of depreciation are; or how to figure out a future "occupancy" rate.

In fact, to answer many of the questions used by the model just, in plain language,

requires information and education that most people do not have. Trying to complete and use the model without expert knowledge can be more dangerous than just going by intuition.

This package gives the professional an automated method of calculating useful information in evaluating real estate investment alternatives. Most professional real estate investment analysts already provide their clients with much of the information produced by REAP through the use of laborious manual calculations. This package provides an easier way for the professional to provide his clients with information.

REAP's documentation, on the input side, is readable and easy to use. Output documentation, as previously mentioned, is nonexistent, but it would really help. It is quite possible that with better output documentation, informed nonprofessionals could use the package.

The REAP model is built by a series of screens which ask pertinent real estate questions. Once you answer a question, there is no way of going back and correcting an answer until you are through with the entire series of questions. Instead, when you are through with the entire series of questions, you select the edit option from the menu and then correct your input.

REAP is for the IBM PC with 64K of memory, at least one disk drive and a printer. The package specifies DOS release 1.0 or release 1.1. REAP doesn't work with a DOS that has been modified for a hard disk. This is not covered in the user's manual. The programs are compute bound rather than I/O bound, thus the inability to use a hard disk is not a problem.

REAP is a good package for analyzing the income potential of a real estate investment. It's not a package for real estate novices who want an assured answer as to whether a real estate investment is good for them. The professional, however, will find this \$149.95 package valuable. (Executiveware, 7415 Pineville Mathews Road, Charlotte, NC 28211.)

Harold Frohlick
Holliston, MA

WordStar Release 3.3

It's been cussed
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Ranks as the best

MicroPro's WordStar has been around for a long time, and it promises to be with us for some time to come. Despite the fact that competition may be gaining, the package remains one of the best word processing systems on the market.

WordStar may possibly be the most cussed and discussed word processing package ever. People have railed at it in

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print for not being responsive to its users (help was easily obtained, so that may be changing).

User associations have installed WordStar interest groups. The package continues to gain acceptance for one good reason: MicroPro's WordStar Release 3.3 word processor is good software.

WordStar is not an easy package to use. It is not even an easy package to learn. However, it is a capable package with a sound training market for the product. Training is required to obtain full use of this package because some features require an experienced user to decipher their meaning and uses.

Walter Etlin's book *WordStar Made Easy* (published by Osborne/McGraw-Hill) provides much of the training for early versions of WordStar. MicroPro learned something from that effort—the package's current tutorial is structured into three distinct learning levels, complete with the suggestion that, for most tasks, the first level will be sufficient. There is also strong indication from this version that MicroPro took criticisms of WordStar seriously.

Despite the difficulties involved in learning Wordstar, the package is as capable as any you will find. There are no windowing configurations, as with the Final Word or WordPerfect.

There is little that cannot be done with WordStar. The windowing configurations are more easily achieved in the SHIFT>> environment, where a full screen may be placed on the monochrome and another full screen placed on the color monitor, allowing you to move between them at will.

The quantity of WordStar's documentation seems formidable when compared to other packages that have fewer features, but draw their market on the basis of simplicity. MicroPro has proved that a word processing package doesn't have to be simple to sell.

WordStar has a number of outstanding things going for it. It will operate in 64K on one drive if that's all you have. Of course, it will operate more quickly with more memory and more drives if they are available.

When working with a prior release of WordStar, I found that the system worked well with a RAM disk and there was no problem in logging to the device. However, under this release, my equipment configuration changed markedly—I encountered both problems and opportunities.

To begin with, my system is a 640K extended PC system. After several attempts to install this release, receiving a message that there was insufficient memory, and after talking with several knowledgeable people about the problem, I finally talked with MicroPro's technical people and discovered that the problem wasn't too little memory—it was too much memory.

So if your system is 640K, their sug-

gestion is to temporarily change the DIP switches to indicate a smaller system.

If you fear DIP switches like I fear DIP switches, that's not a viable alternative. There are, however, at least two other alternatives: first, find a smaller system on which to install WordStar (it installed well on a 256K Compaq) or second, create a smaller partition under <<MEMORY/SHIFT>> (it works with a 128K partition and could work with a 64K partition).

WordStar makes the assumption that the system disk will be resident in the default drive. Since my DOS 2.0 had been placed on hard disk drive C, WordStar was placed there as well—and all works well, so long as the document you are working on is also on hard disk.

If you change the data drive default to Drive B, WordStar expects the system to be on Drive A. Therefore, for successful operation, it's often necessary to keep the system disk in Drive A anyway, assuming that only minor changes are made to the document on Drive B. Another option is to simply transfer it onto the hard disk, work with it and copy back.

Since WordStar first appeared on the market, one of the most difficult things to cope with has been the .BAK file. The intent is to let you recover in case something like a power failure occurs in mid-document (it has).

This means that the new document

may take at least double the size (because of the .BAK file) and that the theoretical limit of any document is half the disk.

For single-sided drives, this means that a maximum of 80K must be set aside for the back-up files. This really isn't a problem for correspondence whose size will never exceed a few pages. For a book writer, it's a problem. The limitation can be alleviated somewhat with double-sided drives and it disappears completely with the hard disk.

If you have a two-disk system, there are some features you may want to assign to the system disk. These will include such DOS utilities as CHKDSK, Format, a software spooler and a software switch to the color monitor.

You have the ability to copy, rename or delete a file within WordStar. You don't have the ability to do a wildcard directory or deletion, which would have been a help, particularly when you want to remove all .BAK files from the media.

WordStar's use of the control key has brought barbs from the critics. Other software vendors who have developed word processors exclusively for the IBM PC have not been shackled by extensive use of the CTL key.

Since WordStar first appeared on the eight-bit CP/M machines, where function keys weren't available extensively, they made an early decision to stick with the

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CTL key functions and to apply them consistently across the board to the machine on which the system was installed.

On the PC, the CTL key functions work, and those functions which could be duplicated to other keys, such as the cursor movement keys, have been moved. You can still move around the screen using the control keys, but it isn't necessary.

They did the same with the function keys. In fact, with this latest release, they have reversed function keys 9 (beginning of the file) and 10 (end of the file). They used to be the other way around and were the source of many complaints.

More functions could have been placed on these function keys (combining them with Shift or ALT), but I can live with these. One of the things that is most striking is the fact that the meaning of the function keys is shown on the status line (25th line of the screen), which is a help—but for the person with WordStar experience, there should be a way to turn off the display.

A testimony to the capability of this package is the WordStar command card. There are more than 130 different commands to tailor your text. In addition, there are more than 40 imbedded commands that will permit you to tailor your output once the document has been prepared. Despite all the brouhaha over control key and codes, once you learn this package, there isn't much that can't be done with it.

If you've never used or seen the package before, be aware that WordStar's document handling is different from other word processors. To begin with, there are two distinct ways to prepare a document—document mode and nondocument mode.

The document mode prepares text just as it will appear on the paper. If you wish to have your document double spaced, the

document will appear double spaced on the screen. Unless you have turned it off, text will also appear in justified format.

You have the option, during the operation of the package, to change margins, headings, footings, page number and location, indentation and so on. You also have the option to establish necessary defaults during the installation phase. It would be nice if the underline and the boldface appear on the screen. Again, they don't for compatibility reasons, and there is some validity for being able to use the same package on several computers. WordStar does, however, produce the desired result on the printed output.

**Compared to prior
WordStar documentation,
this package is
extraordinary. It's
professionally done,
fully illustrated and
competently taught.**

The nondocument mode produces (or reads) an ASCII file. Using this mode you can work with ASCII files produced by Basic programs, other word processors, spreadsheet output and so on. You can also use the nondocument mode to produce program statements for input to a compiler program.

Increase Power and Facility

This latest version of the package offers some increases in power and facility over

prior versions. To begin with, screen handling is vastly improved.

Before, when moving from screen to screen there was a gentle roll. Now there is an almost immediate jump to the next display. It takes a bit of getting used to, but it's a positive feature.

Next, features that have appeared as user-suggested patches in the trade media are now a part of the package. Among these are the use of color features on the color monitor.

Articles have appeared on how to add color. This version comes equipped for construction of a color display. You have options for text color (with its own background color) and menu color (with its own background color).

The black letters on the white background were not as pleasing as I thought they would be. I subsequently settled on a red background for the menu, black letters for the menu, a blue background for the text and a pink color for the text. This combination may not be the best for everyone, but it is certainly striking. The function keys remain illuminated in black on white at the bottom of the screen.

WordStar 3.3 also lets you interface with printers that have specialized capabilities, such as ribbon shifts (e.g., a color printer), expanded print lines, compressed print lines, and so on. *These options are* now available as part of the set-up information. And, while we're on the subject, I should state that the setup for this package is comprehensive and easy to follow. And if you don't like the setup you received, it's no trick to go through the installation module a second time.

An Extraordinary Package

Compared to prior WordStar documentation, this package is extraordinary. It's professionally done, fully illustrated, competently taught and not difficult to use.

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The addition of flow diagrams and reference cards makes the process easy to follow.

There are a couple of snags. In prior versions, when a block of text was marked for movement or cutting, there was a shift in the screen density of the marked block. That feature doesn't seem to work on this version.

Likewise, when a temporary left margin has been established, the ruler line in former versions illuminated so you could see where the temporary left margin was located. This was an important feature, and it is not clear if or how it works on this version.

SpellStar and MailMerge on Menu

I can't leave this article without some discussion of the WordStar options SpellStar and MailMerge. Both packages are available from the WordStar main menu. Using a dictionary of about 20,000 words, SpellStar will check your spelling, provide the ability to augment the dictionary, count the words that are in the document and lead you through the necessary steps to change the document—errors are flagged with a commercial "at" (@). This package works admirably.

The only problem I have with it is the size of its dictionary. It pales against a Random House Dictionary's more than 80,000 words that sells for \$50.

MailMerge is the form letter facility of WordStar. It allows boiler-plated text to be included within the document, adjusting paragraphs as necessary. For an organization that produces a variety of mailing pieces, this package can more than pay for the word processor in the long run.

There really isn't a fixed price for WordStar. It's been advertised from \$160–\$500. Naturally, the SpellStar and MailMerge capabilities are extra. You should shop carefully, remembering that

a customer/dealer relationship is also important.

Worth Its Weight in Gold

Let nobody be deceived. WordStar is a capable package and well worth its price. It doesn't pretend to be all things to all people. It's not the easiest to learn. However, once you get used to WordStar you won't want to change from it, particularly after you've had a taste of working with WordStar in the <<MEMORY/SHIFT>> environment.

(WordStar Release 3.3, MicroPro International Corp., 33 San Pablo Ave., San Rafael, CA 94903; \$495.)

Ken Lord
Winchendon, MA

Minds in Training

An Apple II Plus or IIe And Einstein Maximizes your memory

The other day my mom was quizzing my oldest boy and girl about state capitals. "What's the capital of Idaho?" she asked. "How about Vermont? Rhode Island?" When they got stumped, they turned the tables and asked *her* about other state capitals. On the basis of my scientific observation of these tests, it seems today's schools aren't any worse or better than those of a few years ago.

A Skill Seldom Taught

But it makes a good point: this type of thing—association in a rote sort of way—is something we all do every day. It's also a skill that's seldom taught. Now along comes your Apple and Einstein; together they form a potent team that can help you improve your memory powers.

Would you like to remember faces? Or better yet, to *associate* a name with that face? Or a name *and* a phone number *and* a birth date with a face?

Einstein is an \$89.95 program that will help you do just that. It comes with a 130-page indexed manual and three disks. The system has a lot of clever tools and builds on the solid foundation that all memory is based on association.

Once you've envisioned some sort of relationship between the object you want to remember and its name, it'll lodge somewhere between your ears, and you'll be able to recall it when you need to.

Painless Associations

The authors of this program know what they're doing and impart their knowledge in a helpful way. It's one thing to know that we must associate things to remember them and quite another to have the tools to make the process almost painless. That's the true value of Einstein.

The package is broken down into five lessons. I don't want to give away any of its secrets, but the program covers how to remember names, how to keep track of lists of information, how to structure and reorder those lists as you need to, how to remember dates and the best way to track phone numbers. Most lessons build on the prior one.

There are all sorts of practice sessions in each section that allow you to check your progress. These arrange their tests in a random way, so each time you try, the lesson is different.

In many of these tests, you set the level of difficulty. You can tell the program how long it should display each face it wants you to associate with a name. After each little test, you get instant feedback: the program tells you how many right answers you got and even gives you a per-

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centage score. Unfortunately, if you're perfect, it congratulates you with a little tune that makes you wish you'd missed one on purpose.

File That Thought

Einstein has a method you can use to create your own memory files on disk. For instance, there are a number of names you can make an easy association with. They suggest when you meet someone called Jack, you think of Beanstalk, or when you meet someone named Gail, you think of sail. However, if you have ideas about associations that are more meaningful to you, or want to add to these lists, you can do so from inside the program. Each time you work with it, Einstein will load and use your own information.

The system also comes with a game for which you set the parameters. You decide the display time for each face and data as well as on-screen help and so on. It's a terrific way to test yourself, and comes out of your Apple in a different fashion each time you play.

Einstein has a number of strong points, but it's not perfect. Reset stops the program. However, I couldn't get the system to stop for an error or an improper entry. While you can turn off the music for the demonstration part of the package, you can't for the lessons. Einstein says Beep! a lot.

It's easy to return to the menu left from any place inside the program with Control-C. You also use this command to halt the demonstration program. However, you're told early on to never use Control-C when the disk is working. I don't feel

The manual isn't a tutorial. Rather, it tells you about each lesson and what

The manual isn't tutorial. Rather, it tells you about each lesson and what you'll do as you work with it. The illustra-

tions are helpful. It's a good memory-training aid, even without the program disks.

It's important to remember that, as with any device that helps you learn anything, you have to use the tool and work with the project. Like that memory book you bought a few years back and can't remember where you put, Einstein won't do you any good until you sit down and work through its lessons. It does help make the process fun, though.

It's difficult to get a handle on exactly what BIZPAK II is.

Einstein requires a 48K Apple II Plus or IIe and one disk drive. The system is available from The Einstein Corp., 11340 West Olympic Blvd., Los Angeles, CA 90064.

Greg Glau
Prescott, AZ

BIZPAK II

Communications tool for
General business,
Accounting and ordering

It's difficult to get a handle on exactly what BIZPAK II is. The 91-page manual says it consists of three major parts: General Business, Accounting and Ordering.

These terms are ambiguous, and even

though the three sections can communicate with one another, the system suffers from a lack of direction. This is partly due to the limited tutorial, which covers only a smattering of the package. It does come on a cassette tape as well as on paper, which is an interesting approach.

This ambiguity also exists because the documentation explains *how* to do this or that but neglects to discuss the general purpose and focus of the package.

With a 48K Apple, two disk drives, and a printer plugged into Slot 1, the menu-driven BIZPAK II is easy to move around in. Unfortunately, getting started involves some disk-swapping. The package I looked at came with only the demonstration disks that hold sample data. These sample disks didn't allow access to some areas of the program, such as the ordering section and the copy instructions.

From Inventory to Invoice

In the accounting realm, BIZPAK will let you access your inventory records in order to draw data as well as to create and print invoices. You can override any prices there and/or put items that you don't carry in stock on an invoice. The program automatically updates the customer and sales files as each invoice is created. Your screen is still alive as each invoice is printed; you see the data scroll up and away.

However, the only way you can post a customer's account is from an invoice that you generate with the system. If you can dedicate your Apple to handle all of your invoices, this isn't a problem.

Your first disk can hold 1118 customer accounts; if you add additional disk drives, each can handle 1120 new accounts for you. The package lets you add sales tax to each purchase; the program stores the percentages on disk and does the math

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when you indicate which invoices get charged any of three different tax rates. The system also prints statements, although the copy I had couldn't access that part of the program.

BIZPAK also tracks your income statement and balance sheet figures for you and produces these two reports on demand.

Fig. 1 shows what the Income statement looks like; it's pretty basic. It does many reports on your information; in fact, one-quarter of the manual's pages are sample reports. The system gives you an aged list of receivables and even can break them down by the "territory" they're in. However, since all I had were the demo disks, when I tried to print the aging report the system filled my screen with garbage and refused to print anything.

While the package is strong on reports for accounting, it doesn't allow you to break down each sale by its different components. It assumes you sell only material, which goes along with the basic concept that the system does all invoices and pulls its data from the inventory files. The package reports inventory but doesn't let you report any labor sales, contracts, outside services or products you sell.

BIZPAK II is an unusual program . . .

The number of inventory items the system can handle varies by the length of the product's name and the memory you have. If you have a 48K Apple and can live with inventory names no longer than 16 characters, BIZPAK will track 700 products for you. With an extra 16K of memory, this total jumps to 1210. While there's not a true reorder summary available, the system does indicate which items have fallen below their minimum level with an asterisk before their name.

As a pure inventory control package, BIZPAK is fast when you enter data and when you change it. As you print invoices, the amounts you charge to customers are deducted from current stock.

While the inventory section can function by itself, it's designed to deduct things from what you have on hand only when invoices are created. This limits its value if you want to use it as a stand-alone inventory program.

BIZPAK can print a price list (which some "major" inventory programs can't do) but it doesn't have a way to track purchase orders for you (although it can write them). However, because the order part of the system wasn't accessible, I wasn't able to examine how well it performed. You can get a cost estimate for a project or a quotation if you use the estimated quantities along with your inventory data. That's a helpful function.

The system will also give you printouts of how much of each product you've sold

as well as the value of your inventory for up to 30 different categories. There's no way to suppress categories (or whatever) for which there's no data; you get a lot of zeros in your printouts.

Special Features

BIZPAK offers several unusual features. A bulletin board allows you to leave messages for the next person who uses the system. You're told that "Looking at the bulletin board should always be the first task upon starting the day. . . ." Really?

BIZPAK also lets your Apple function as a cash register—it will post your material and sales tax amounts to the proper categories and print a receipt.

When you print invoices, the amount sold to the prior customer appears on the current screen display. This is handy if you happen to sell the same things to each customer; if you don't, you have to manually delete these entries. Numbers must be entered with all trailing zeros (ten dollars is put in as 10.00).

While BIZPAK can check to balance your journal entries, it lets you delete accounts with activity in them. I deleted both the cash sales account and a customer named Jack Potte's account on the sample disk—and couldn't recover either and they both had entries in them. BIZPAK doesn't call itself a payroll system, but holds regular weekly payroll data in its files, evidently so you can post the details to your general journals. It also stores year-to-date totals for each employee, although they must be entered manually onto disk.

Summary

BIZPAK II is an unusual program with useful functions. You can use it to create a balance sheet or income statement, as kind of an inventory program or as a system that prints invoices and keeps simple customer records. If you sell only material from stock on hand, BIZPAK will help automate your business.

BIZPAK isn't a full-blown accounting or inventory package. The system is at its strongest in the variety of reports it can create and in its invoicing. It leads you around well and always informs you as to what it's doing.

Generally, it's well error-trapped and lets you back out of a menu selection you make accidentally.

BIZPAK weakest point is that while it can do a touch of inventory and payroll plus a decent smattering of accounting, it's not really designed for these purposes.

Before you buy it, I recommend that you and your accountant spend some time with the system to make sure it can do what you need it to.

BIZPAK II is available for \$1250 from Mid-West Marketing, Box 26849, Denver, CO 80226.

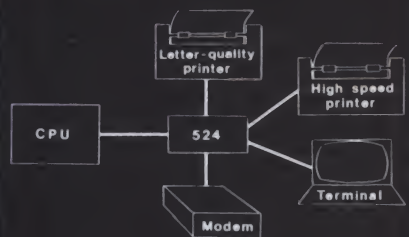
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The Price Is on the Rise But Is the Investment?

Engage in real estate
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There are many things to consider when purchasing investment real estate. The Real Estate Analysis Program, REAP, takes a look at one important question: All things considered, will you make money?

In the current real estate environment prices are always on the rise, which leads the general public to assume that real estate is a good investment. A popular sports figure made this assumption and invested millions of dollars from his sports income in real estate. Now, after ten years, this important sports figure is making television ads in order to keep his house and home together. The athlete claims that a misspelling of the short name for this package, REAP, is what happened to him.

Could the REAP software have helped? The answer is maybe.

How Does REAP Work?

REAP builds a real estate investment model that attempts to take into account most of the common factors that determine whether or not a particular investment will make money.

REAP takes a commercial investment and breaks it down into its components. These components are expressed in a series of data entry type screens.

The screens are data entry in nature because you must complete all of the screens and then run the analysis program on the data entered. There is interactive editing, but the answers must wait until all of the entry is complete.

Screening the Deal

Questions asked by the entry screens in-

dicating the power of this package.

In figuring the adjusted cost basis, the screen asks you how much you will actually pay for the property. Normally the cost is the same as the purchase price, but it will differ if there is a capital improvement that the seller will make for you as a condition of purchase.

Another screen questions the selling cost. Real estate fees and taxes that make up the selling cost are expressed as a percentage of the purchase price.

REAP looks at
the question:
all things considered,
will you
make money?

The next screen helps you determine the cost of money. Several loan options are considered here, including investing in up to three loans, assuming there is already an existing loan, and refinancing in balloon amounts. This screen also offers you provisions for variable interest loans and the Rule of 78 permits you, for tax purposes, to recognize a higher interest expense in the first years of a loan.

After examining loan alternatives, another screen will help you determine the expected property income and the effects of certain factors on that income.

The screen asks you what income is currently expected from the property and how it will change in the future. This allows you to change income for each year under study.

Other considerations this screen asks you include:

- If the property produces income from

rental, what is the expected vacancy (not rented) rate? What is that vacancy rate going to be in the future?

- How much is it going to cost to keep the property up? How much will it cost to operate the property in the future?
- How should the depreciable portion of the investment be depreciated?
- Should any monies be put into reserve to pay for future improvements or major maintenance?
- What is your tax bracket?

Menu Time

Once you answer the list of questions, a menu appears and gives you data options. I decided to execute the analysis report.

Once you choose to run the analysis, it is time to take a coffee break. This program takes a while! I set up a complicated investment with three loans and the program ran for nine minutes. I actually was starting to believe that my beloved PC was broken.

When I printed the report, I was deluged with a volume of information. It is important to note that none of the information is available on your screen. The printed report is the only source of information.

What does all this mean? A thorough reading of the user guide gave me no help in interpreting the output of the program. Although the input is covered in some detail, the output and its use are not discussed. One look at the printed report will tell you that this is a definite failure of the documentation.

I sought the help of a local real estate agent. Discussing the report, it became clear that the level of expertise needed to interpret the report wasn't close to the regimen needed to pass most state real estate exams. To put it simply, most real estate agents will be unable to use this package's potential.

I was able to locate a financial specialist who went over the reports and pointed out

(Continued on p. 140)



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